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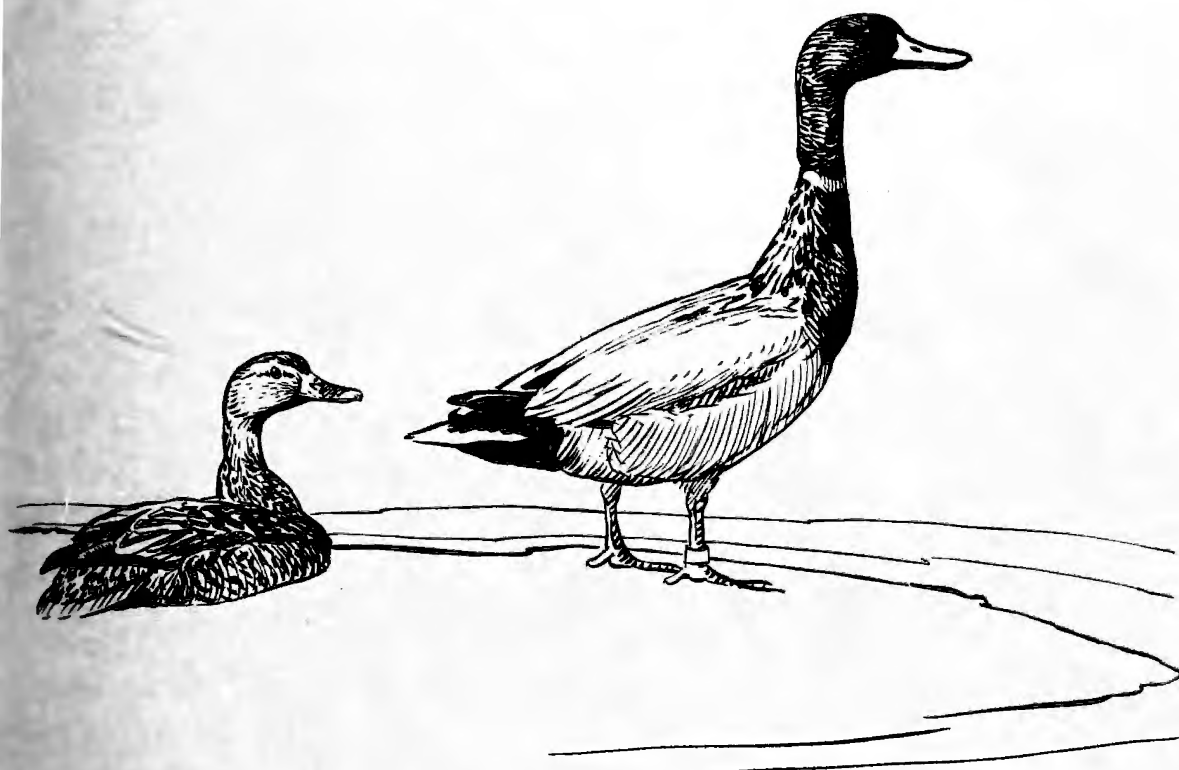
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WATERFOWL STATUS REPORT 1963



**UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
Special Scientific Report--Wildlife No. 75**

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UNITED STATES DEPARTMENT OF THE INTERIOR, Stewart L. Udall, *Secretary*
FISH AND WILDLIFE SERVICE, Clarence F. Pautzke, *Commissioner*
BUREAU OF SPORT FISHERIES AND WILDLIFE, Daniel H. Janzen, *Director*

WATERFOWL STATUS REPORT, 1963

Compiled by

Fred A. Glover, *Chief*
and
J. Donald Smith, *Assistant Chief*
Section of Surveys and Banding

BRANCH OF MANAGEMENT AND ENFORCEMENT

in collaboration with

BRANCH OF WILDLIFE RESEARCH



FISH AND WILDLIFE SERVICE
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WATERFOWL STATUS REPORT 1963

Each year in early August waterfowl shooting regulations are established for the current hunting season. Most of the information presented in this report was considered in the formulation of the regulations. Additional data have been compiled and presented to provide reference material relating to the status of waterfowl.

Data on the status of North American waterfowl are collected by four major surveys each year:

1. The waterfowl kill survey, a mail questionnaire of selected waterfowl hunters immediately after the hunting season, to measure the size and species composition of the kill and effect of hunting regulations on activity and success.
2. The wing collection survey, a sampling by mail of selected hunters who send in duck wings during the season to provide information on age ratios in the hunting kill.
3. The winter survey, a survey of waterfowl wintering areas on the North American Continent in early January to determine the distribution and relative numbers of birds remaining after the hunting season.

4. The breeding ground survey, a survey of major continental breeding areas in May, June, and July to measure size and distribution of the breeding population and the relative number of young produced.

In recent years a fifth major data-collecting endeavor has been banding, particularly the banding of young birds on the breeding areas. The purpose of this banding is to relate breeding areas to harvest areas so that data from breeding ground surveys can be accurately associated with the four waterfowl flyways for management purposes.

Results of the winter and breeding ground surveys are summarized as forecasts of anticipated changes in the relative size of the 1963 fall flight of ducks, geese, brant, and coots in each of the four flyways in the United States.

Because waterfowl management in the United States is based on the flyway concept, this report is organized accordingly. For purposes of this report, the four flyways have been extended beyond the international boundaries of the United States to include breeding and wintering grounds of waterfowl most closely associated with the flyways.

SCOPE OF INVESTIGATIONS AND METHODS USED WATERFOWL KILL SURVEY

Data supplied by Robert G. Heath and M. Edwin Rosasco,
Bureau of Sport Fisheries and Wildlife

Immediately after the hunting season each year, the Bureau of Sport Fisheries and Wildlife conducts a national mail questionnaire survey of waterfowl hunters designed to meet the following objectives:

1. Estimate, at both flyway and State levels, the magnitude of the waterfowl harvest, the total number of hunters active during the season, the total number of hunter-days afield amassed by these hunters,

and the average seasonal performances a hunter in terms of days hunted and waterfowl bagged.

2. Measure the relative changes in these estimates from year to year.
3. Assess the effects of changes in season length and size of daily bag limit on total bag and on hunter performance.

The 1962-63 hunting season marks the 11th consecutive year of the survey since its inception in 1952.

Since there is no complete listing of waterfowl hunters to facilitate the survey, by necessity, the survey utilizes as its sampling universe those post offices throughout the Nation selling Migratory Bird Hunting Stamps (hereafter "Duck Stamps"). Each year more than 2,000 post offices are designated to cooperate in the survey as "sample outlets." These outlets have been selected randomly, within States, from two strata of post offices: main offices having outlying branches and stations under their jurisdiction (usually in larger town and cities), and offices without branches or stations (usually in smaller towns and rural localities). A further refinement in stratification—that of subdividing each State into several geographic "zones," while retaining the post office class strata within each zone—was devised and made operative beginning with the selection of the 1963-64 sample outlets. The attempt in zoning was to devise geographic areas wherein the average seasonal duck bag a hunter among post offices of stamp purchase, was expected to be the most similar, thus increasing survey precision. Zoning also insures a more even distribution of sample outlets throughout a State.

Names and addresses of hunters are obtained by means of business-reply "contact card" distributed to all persons buying Duck Stamps at sample outlets. The card requests the individual's name and address, the number of stamps he purchases, the reason for his purchase, and the number of persons in his household under the stamp requirement age of 16 years who might hunt waterfowl during the season.

All contact-card respondents who purchase stamps for the purpose of hunting are mailed a hunter questionnaire at the close of the season. The 1962-63 questionnaire asked each hunter the total number of days he hunted waterfowl, his total bags of ducks, geese, and coots, and the number of each he knocked down but failed to retrieve. These data, in

combination with total reported sale of Duck Stamps by State, have been used to derive the various survey estimates.

All estimates are subject to several sources of error (as is true for most type surveys). In addition to chance error due to random sampling variation, the estimates may be affected by misreporting (respondents tend, for example, to exaggerate their bag). The estimates are further subject to non-response bias in that hunters who fail to respond may have differed from respondents in their hunting performance.

A further potential source of error, that of faulty reports of Duck Stamp sales, this year developed into a serious problem. Since it is necessary to present kill estimates no later than early July to be available for regulations meetings, the reported sales for the first three-quarters of the fiscal year (July 1 to March 31) must be used in deriving total kill and activity estimates instead of the full year's sales (the sales for the last quarter of the fiscal year are not available until mid-August). Prior to 1959, the three-quarter year reports were generally identical to those for the full year; since that time, however, a small but increasing percentage of sales have been reported during the fourth fiscal quarter (April 1 to June 30). Whether such reported sales had actually occurred during the fourth fiscal quarter was difficult to establish: purchases by conservationists and philatelists were considered a possible explanation. This year, however, it became apparent beyond reasonable doubt because of the magnitude of the fourth-quarter sales reports of many State, that the three-quarter year sales reports were incomplete. (In certain States, as high as 25 percent of total sales were erroneously reported to have occurred during the fourth fiscal quarter, and certain post offices furnished no three-quarter year data whatsoever.) Unfortunately, such errors can not be detected until after regulations meetings. Measures to correct this reporting lag are now being negotiated with the Post Office Department.

Because of the incompleteness of the three-quarter fiscal year sales reports, it was necessary to recompute the entire 1962 analysis. The revised estimates, based on the full-year's stamp sales, are presented in this report.

The 1961 estimates presented here for comparison with the revised 1962 estimates have also been adjusted so as to be based on

full-year instead of three-quarter year 1961-62 sales. Although the 1961 adjustments are of a lower magnitude than the 1962 adjustments, the revision was necessary to make valid measurements of harvest and activity changes between the 2 years.

Both years' estimates are based on the analytical method employed in 1961. The 1962 estimates were also derived using the Bureau's recently developed electronic computer program. In the Central and Mississippi Flyways they agreed well with the 1962 estimates derived by the "1961 method," but tended to give higher results in the Pacific and Atlantic Flyways. Therefore, the computer estimates are not presented and need further scrutiny before being accepted or rejected. (While the computer program is mathematically correct, difficulties, if real, probably stem from occasional meager returns from post offices selling large numbers of Duck Stamps.)

All 1961 and 1962 flyway estimates of the duck, goose, and coot bags have been adjusted for response bias by reducing the reported bags by the same proportion as in the 1960 analysis. This method of bias adjustment was used because the existing procedure (Atwood, 1956)¹ was not designed to deal with a 2-duck daily bag limit as prevailed during both years in many States, and because new studies of the nature of response biases may suggest refinements.

The contributions of unlicensed "junior" hunters to the various harvest and activity totals were not measured directly in 1962, but instead have been included in these totals from estimates based on the proportions of their contributions during the 1961 season when direct junior estimates were made. The above proportions are small, ranging from 2 to 5 percent of the various totals, so that

even if moderately in error, they have relatively little effect on the accuracy of the survey totals.

The species composition of the duck kill is based both years on the findings of the Bureau's Duck Wing Survey. The species composition of the 1962 goose bag has been derived from the new Goose Tail Survey, while that for 1961 is from questionnaire reports of hunters. Since the two methods may not yield strictly comparable results, estimates of percentage change in the bags of species of geese are not shown.

The 1962 estimates reported herein, which have been derived from the responses of approximately 36,700 hunters contacted throughout 2,300 post offices, include the following measurements:

1. Total flyway bags of ducks and geese, by species, and coots, each adjusted (as described above) for response bias; and total ducks, geese, and coots knocked down but not retrieved.
2. State estimates of total duck and goose bags unadjusted for response bias, and the full-season average bag a hunter of ducks and of geese.
3. State and flyway estimates of the total number of "potential" hunters (those purchasing Duck Stamps for the purpose of hunting and junior members of their households expecting to hunt); (tables A-1, A-2, A-3, and A-4, pp. 59-60) the total number of "active" hunters (those potential hunters who hunt at least once during the season); the total number of hunter-days afield amassed by all hunters; and the average number of days afield an active hunter during the season.

WING COLLECTION SURVEY

Data supplied by Samuel M. Carney and Alfred J. Godin
Bureau of Sport Fisheries and Wildlife

Each year while the hunting season is in progress, the Bureau of Sport Fisheries and Wildlife collects through the mail from hunters a sample of duck wings that is rep-

resentative of the total duck kill. These wings are used to:

1. Determine the age and sex ratios in the kill for the mallard, the black duck, and for certain other species of ducks.

¹See Literature Cited, page 58.

2. Determine the duck species composition in the kill.
3. Obtain information on changes in the species, sex, and age composition of the kill during the season.
4. Determine the chronological distribution of the duck kill by periods within the season, days of the week, and hours of the day.
5. Secure a variety of other types of information that can be obtained from duck wing surveys.

Immediately before the opening of the hunting season, the hunters to be sampled are sent supplies of business reply envelopes and are asked to return one wing from each duck they kill during the coming season. A post card addressed to the Bureau is included for use by those hunters who might exhaust their envelope supply. The hunters whose kills are sampled in this manner are selected largely from respondents to the Bureau's mail questionnaire survey of the previous year who were over 15 years old and who had reported bagging at least one duck. Additional hunter-contacts come from lists of respondents to the previous year's wing surveys and in a few instances from lists of hunters who had reported bagging a banded bird. An attempt is made to draw samples of waterfowl hunters that are distributed geographically within a State in the same proportions as the distribution of duck stamp sales. This was not

possible in a number of States because an insufficient number of names was available. Until the resultant data can be reweighted recognizing the differences in sampling intensity between geographic portions of States, the estimates presented in this report must be regarded as preliminary. It is not anticipated, however, that the more refined weighting procedure will greatly change the findings presented here. Details of the procedures followed and the technique involved have been summarized elsewhere (Geis and Carney, 1961, and Carney and Geis, 1960).

All wings received are kept frozen until they can be examined by teams of State and Bureau biologists who assemble at freezer-storage points and identify the species, age, and sex of the bird each wing represents. This information is reduced to a series of numerical codes and summarized by the Machine Data Processing Unit at the Migratory Bird Populations Station at Laurel, Maryland.

The number of hunters contacted and the number of wings they returned each year are presented by flyways in table B-1 (p. 74). Because all the names of the hunters contacted were not obtained in exactly the same manner each year, the differences in hunter-response between years should not be interpreted as an indication of changes in hunting success. Section B (p. 74) of the appendix contains tabular data summarizing the annual results of the wing collection survey.

WINTER SURVEY

Data supplied by Fred A. Glover
Bureau of Sport Fisheries and Wildlife

The annual winter survey to obtain information on waterfowl wintering conditions and distribution covered all major wintering areas of the United States, Canada, and Mexico. In Mexico the Bureau of Sport Fisheries and Wildlife organized and conducted the survey. In the rest of the continental United States, the Bureau organized the survey, but much of the field work was done by personnel of the various State conservation departments. The U. S. Department of Defense and the U. S. Coast Guard supplied aircraft for aerial counts in many areas. In Canada, the survey was organized by the Canadian Wildlife Service and the Provinces.

The wintering areas were surveyed by means of boats, cars, and aircraft, with most of the important areas being censused from the air. Aerial photographs were taken to supplement visual estimates in some of the more important concentration areas.

It must be emphasized that the number of birds observed and recorded during the winter survey does not constitute an estimate of the total population in any flyway or for the continent as a whole for the following reasons: (1) the survey includes most but not all wintering areas of North American waterfowl; (2) some species are more visible than others; and (3) inherent variables existing in the

estimating technique. However, for most of the wintering areas it is believed that the yearly data for geese and certain other species such as the black duck and swan can be used to indicate broad trends in population size. In addition, the winter survey data have great value for determining the use made of various wintering areas and the change in

waterfowl distribution from year to year in response to changing weather and habitat conditions.

All data referring to the 1963 winter survey are based upon observed birds.

Section C (pp. 79-103) of the appendix contains tables summarizing the results of the annual winter survey.

BREEDING GROUND SURVEY

Data supplied by Fred A. Glover
Bureau of Sport Fisheries and Wildlife

Surveys are conducted each year on the waterfowl breeding grounds for the purpose of estimating the relative size of the fall flight from each of the breeding areas. Two coverages of the breeding areas are required to obtain the necessary information: the first, during May and June, to measure distribution and relative size of the breeding population; the second, during July, to forecast the relative number of young that would be produced. In July it is necessary to make a preliminary estimate or forecast of the number of young that will be produced, since only a part of the season's young will have hatched at the time field work must be terminated so that data will be available for setting the shooting regulations. The production survey, therefore, consists of a measure of the number of broods on the water at the time of the survey plus a measure of weather, water, and other conditions that affect or reflect production success following the survey period.

Most of the important waterfowl breeding areas in Alaska, Canada, North Dakota, South Dakota, and Minnesota are surveyed from the air. Statistically designed sampling techniques and similar methods of collecting and analyzing data are used throughout these areas. In addition to the areas mentioned, many of the Northern States conduct breeding grounds surveys. Methods vary somewhat among these States, although in States with important numbers of breeding ducks the methods are similar in most respects to those employed in the Dakotas, Canada, and Alaska.

In recent years, aerial crews have sampled approximately 2,375,000 square miles of the best duck breeding habitat on the North American Continent. The only important duck breeding areas that are not being censused by standard survey procedures are

those in eastern Ontario, Quebec, and Labrador, for which adequate census techniques and data analysis have not yet been developed. Experimental surveys are being conducted in this area but they have not progressed to the point where reliance can be placed on the findings for forecast purposes.

The aerial crews count the birds on somewhat less than 1 percent of the total breeding area. This is sufficient coverage to reduce sampling error to less than 20 percent of the average population density in most survey areas, and to much less than 20 percent when considering the breeding range as a whole.

The results of the breeding ground surveys are presented as indexes. When conducting aerial surveys of breeding birds or of broods, not all birds present are seen by the aerial crews. Methods of measuring the proportion of birds present that are seen are being developed, but these studies have not progressed to the point where visibility factors can be determined throughout the breeding range. Since there is no attempt to estimate the number of birds not seen, the indexes presented in this report are based on birds actually seen, and it is emphasized that they do not constitute estimates of the total numbers present.

Results of the May survey of the breeding population and of the later production survey, when combined, form the basis for forecasts of changes in the relative size of the fall flight of ducks and coots in the three Flyways from the Mississippi Flyward westward. It is not possible to rely on the breeding ground information to the same degree in the Atlantic Flyway as in the other Flyways, primarily because of the lack of adequate survey data from Quebec and Labrador, which are important contributors of birds to that Flyway. Experimental aerial surveys were conducted

in these Provinces in 1962 and 1963 by the Bureau of Sport Fisheries and Wildlife. It is expected that this experimental work will be the foundation for operational surveys in Quebec and Labrador in the future.

The breeding ground surveys are cooperative. The Bureau of Sport Fisheries and Wildlife, the Canadian Wildlife Service and the

Provincial game branches, Ducks Unlimited, and the State conservation departments combine their equipment and manpower to conduct the necessary surveys throughout the vast extent of the waterfowl breeding range.

Sections D, E, and F of the appendix contain tables which summarize the annual breeding ground surveys.

BANDING

Data supplied by Aelred D. Geis,
Bureau of Sport Fisheries and Wildlife

Banding is an important source of information which is essential to the proper management of the waterfowl resource. In recent years cooperative banding programs have been established with specific management objectives in mind. Currently the major

banding effort is directed toward pre hunting season banding, wood duck banding, winter banding, and the banding of flightless young on the breeding grounds. The objectives and current progress of these programs will be briefly summarized.

PRESEASON BANDING

Pre hunting-season bandings provide the most precise measure of the shooting pressure to which each age and sex component of the pre hunting season population is subjected. In order to obtain adequate banded samples from the pre hunting season population, a number of preseason banding stations have been established across northern United States and Canada. The emphasis has been directed toward mallard and black duck banding. Recoveries from these bandings not only provide the best estimate of changes in the annual rate of kill, they also provide information on the annual survival, the importance of hunting as a mortality factor, the effect of changes in hunting regulations, and can be used in conjunction with kill survey and wing survey information to make population estimates.

In the late summer and fall of 1962 about 30,000 mallards and black ducks were banded. Recovery rates of the larger banded samples, along with comparable rates from previous years, are presented in table G-1 (p. 160). Mallard recovery rates from the Central Flyway stations showed a pronounced drop, indicating a reduced kill in 1962. Mallard recovery rates in the Pacific Flyway had a tendency to decline slightly in 1962. Unfortunately the preseason banding program in the Prairie Provinces of Canada resulted in banding far too few birds to yield the desired information.

Recovery rates from preseason bandings of black ducks are presented in table G-2 (p. 161). Black duck recovery rates showed no pronounced change from 1961.

WOOD DUCK BANDING

The wood duck banding program has several objectives. Hunting kill rates can be determined from these bandings, annual mortality estimates can be made, and the effect of hunting as a mortality factor can be examined. Since the wood duck has been subject to special regulations for many years, wood

duck bandings are important in evaluating the effect of these regulations. The wood duck is a species which cannot be adequately counted during normal population surveys and as a result, indirect population estimates based on banding data and kill information provide the best estimates of wood duck numbers.

During the past year, wood duck bandings occurring prior to 1960 were examined. The results of this study will be briefly summarized: Immature mortality rates have ranged from 46 percent to 75 percent and have shown a clear relationship to recovery rates. This implies that the survival of young wood ducks has been influenced by shooting pressure. Adult females had mortality rates which ranged from 47 percent to 59 percent, while that of adult males ranged from 45 percent to 56 percent. There was no obvious relationship between the mortality rates and recovery rates of adults. During these same years (1930 to 1960) wood duck recovery rates were about 30 percent higher in the Atlantic Flyway than in the Mississippi Flyway. This difference indicates a difference in shooting pressure on the wood duck between flyways. Over the years immature birds have been 1.4 times more likely to be shot than adult birds.

In 1962 there were 20, 118 wood ducks banded in the United States and Canada. The distribu-

tion of the wood duck banding effort is such that segments of the continental population were not represented in the banded sample. In spite of this, a wood duck population estimate was made utilizing recovery rates from the summer and fall bandings along with wood duck kill information from the hunter questionnaire survey and the wing collection survey. The results indicated that there were approximately 2,138,000 wood ducks in the Atlantic and Mississippi Flyways before the 1962 hunting season. Some recovery rates from the 1962 preseason bandings of wood ducks, along with comparable rates from previous years, are presented in table G-3 (p. 162).

The 1962 wood duck recovery rates from comparable banding locations in the Mississippi Flyway indicated that the rate of kill of wood ducks in this Flyway increased 38 percent over 1961. This increase in rate of kill was associated with an increase in the wood duck bag limit from 1 to 2, while the mallard and black duck bag limit was reduced from 2 to 1 in this Flyway.

SUMMER WATERFOWL BANDING, ALBERTA, SASKATCHEWAN, MANITOBA, AND NORTHWEST TERRITORIES, CANADA

Data supplied by J. D. Smith,
Bureau of Sport Fisheries and Wildlife

The 1963 Canadian banding operation was divided into five main projects:

1. The trapping of flightless young mallards by retrieving dogs on permanent check areas.
2. Drive trapping for flightless young and moulting adult divers in the Yellowknife area of the Northwest Territories.
3. Drive trapping for blue-winged teal in the Prairie Provinces.
4. Drive trapping for moulting divers in a remote area of northern Alberta.
5. Preseason bait trapping.

Fifty-three men took part in the program including twelve from six State conservation departments, one private hunting association,

and two Canadian Provincial wildlife departments. The fifteen crews banded approximately 22,000 ducks. This is a larger total than was obtained in 1962 in the same region but is less than half of the average annual catch of the midfifties. It is almost a direct reflection of the lower waterfowl numbers found in the Canadian Prairies now compared with a few years ago.

Noteworthy in 1963 was the success of the attempt to drive-trap moulting diving ducks in a remote area east of Fort McMurray, Alberta. Gordon Lake, the banding site, is inaccessible by road; consequently, aircraft had to be used for transportation of personnel and equipment into the Lake. Two Cessna 180's on floats and one Grumman Goose were used in this operation.

By mid-August a flock of about 25,000 moulting lesser scaup was observed on Gordon Lake. Traps were set up and approximately 3,000 ducks were caught and banded. Since the operation was largely a trial in 1963 wherein new equipment and methods were tested, it is believed that future catches will be much larger. In the future such "bush" banding operations will be expanded to other lakes in the timber country north of the prairies where large concentrations of ducks are observed.

About 9,000 ducks were banded by seven crews operating pre-season bait stations this year. This is far better than the total obtained last season but still falls short of the number desired. With improved techniques and a shift of trapping sites to areas of higher waterfowl numbers it is expected that in 1964 the quotas set by the Branch of Wildlife Research, Bureau of Sport Fisheries and Wildlife, for this operation will be met.

The drive-trapping crews operating in the prairie portions of Alberta, Saskatchewan, and Manitoba banded approximately 5,600 ducks, about half of which were blue-winged teal. The drive crew assigned to the Yellowknife locality in Northwest Territories trapped and banded over 600 local and adult ducks. While this does not appear to be a large num-

ber it represents many hours of extremely hard work. The trapping there is spread over many, small, timbered ponds interspersed in muskeg, accessible only by difficult portages of canoes, banding equipment, and personnel.

The five crews using retrieving dogs banded approximately 1,700 ducks during July. In Manitoba, the crews were hampered by high water levels and heavy vegetation; while in Alberta and western Saskatchewan their success was limited by a shortage of mallard broods. One experienced bander stated that in the Coteau area south and west of Moose Jaw he was able to band in one day in the mid-fifties, as many mallards as he caught this year (1963) all the month of July.

It is anticipated that in the 1964 Canadian banding program increased emphasis will be placed upon pre-season bait trapping of mallards and black ducks, the banding of waterfowl in the remote areas of northern Alberta and Saskatchewan, and in obtaining adequate samples of certain species by drive trapping in the prairies to provide information necessary for species management problems. If the Canadian Prairie waterfowl habitat continues to improve throughout the winter and spring, the 1964 banding program will undoubtedly produce a much larger banded sample than was obtained in 1963.

SUMMER WATERFOWL BANDING IN THE DAKOTAS, NEBRASKA AND MINNESOTA

Data supplied by F. H. Davis
Bureau of Sport Fisheries and Wildlife

In the stateside portion of the prairie breeding grounds, six crews totaling 24 men banded a total of 10,606 waterfowl during the summer of 1963. This marks the renewal of a banding effort in the southern part of the prairies to band a portion of the ducks produced in that area. Approximately 7,800 of the total obtained were blue-winged teal captured by the drive trapping technique.

The distribution of the waterfowl catch by State was as follows:

| | |
|--------------|-------|
| North Dakota | 4,012 |
| South Dakota | 4,103 |
| Minnesota | 611 |
| Nebraska | 1,601 |

Plans call for the continuance of this stateside banding effort in 1964. Greater emphasis in the future will be placed on obtaining larger samples of local mallards in certain areas of the Dakotas and in obtaining adequate samples for species management problems.

HUNTER OPINION SURVEY

RESTRICTIVE DUCK HUNTING REGULATIONS

Data supplied by Robert G. Heath and M. Edwin Rosasco,
Bureau of Sport Fisheries and Wildlife

The restrictive duck hunting regulations enacted in the face of low duck populations during the 1961-62 hunting season, and especially the 1962-63 waterfowl seasons have raised a number of important questions regarding the opinions and reactions of hunters to various types of restrictions. Accordingly, the Bureau conducted a mail questionnaire survey immediately after the 1962 season designed to measure hunter opinion on the subject of restrictive regulations.

The primary reason for the survey is explained to the hunter on a questionnaire message sheet as follows: "The problem: In years when ducks are scarce and hunting must be restricted, the Bureau wants to know how short a season and how small a daily bag limit the majority of hunters feel is practical before they would prefer a closed season." The survey is also designed to learn if there are hunter preferences among different types of restrictions and the most important reasons why hunters active in the past failed to buy duck stamps in 1962.

It is most important to note that the findings of the opinion survey are intended for use only as a guide in establishing hunting regulations after biological determinations have formulated how large a duck kill is permissible. They are not a substitute for biological considerations in any respect.

Methods

The Bureau wished to derive information that as far as possible would express the opinions of all potential duck hunters, and not merely the reduced portion active in 1961 or 1962. Therefore, only persons active during the 1960 season were contacted, since more hunters were active that year than in any year since 1958. Questionnaire recipients were selected by systematically subsampling the names of all hunters contacted in the 1960 waterfowl kill survey. (The 1958 mailing list of hunters, although available, was judged too old to be useable.).

The questionnaire first asked hunters which they would have preferred in 1962, the restricted duck hunting regulations that were

enacted, or a closed season. It then asked in four independent but identically worded questions, how short a season the hunter would accept before preferring a closed season, if given daily bag limits of 4, 3, 2, and 1 duck.

Next, hunters were asked which type of hunting restriction, when necessary, they would prefer: a significant reduction in daily bag limit but no reduction in season length; a significant reduction in season length but no reduction in daily bag limit; or a moderate reduction in both daily bag limit and season length. The questionnaire asked if the hunter bought a duck stamp in 1961 and if he bought one in 1962. Finally, for hunters who did not buy a duck stamp in 1962, it listed the following seven possible reasons for failure to do so and asked them to identify the first and second most important reasons for their decisions:

1. Bag limit so small that hunting not worthwhile.
2. Season so short that hunting not worthwhile.
3. Predictions before season indicated few ducks.
4. Too few ducks in hunting area during the open season.
5. Discouraged by poor hunting in 1960 or 1961.
6. Risk of accidental violation too great due to difficulty in identifying protected and restricted species of ducks in flight.
7. Other reasons. (Please describe)

Results

A total of 2,785 useable questionnaire responses were derived from a total hunter contact of approximately 5,000 individuals. Useable returns, by flyways, are as follows: Pacific Flyway, 526; Central Flyway, 608; Mississippi Flyway, 1,203; and Atlantic Flyway, 448.

Findings, although presented for States as well as flyways, are intended to have precision primarily at the flyway level. They should be viewed guardedly at the State level, due to small sample size. (This is especially

true in the Atlantic Flyway States of Connecticut, Georgia, New Hampshire, Rhode Island, Vermont, and West Virginia.)

In the Atlantic and Pacific Flyways a majority of hunters (64 and 73 percent) reported preference for the restrictive 1962 regulations rather than a closed season (table I-1, p. 166). In these Flyways, however, regulations were much less restrictive than in the Mississippi and Central Flyways where only a minority (38 and 35 percent) preferred the open season (table I-1).

Of the three types of restrictions offered for a judgment of preference: (1) a significant reduction in the daily bag limit but none in season length, (2) a significant reduction in season length, and (3) a moderate reduction in both daily bag limit and season length--the third option was preferred in all flyways, followed in preference by the second option (table I-2, p. 167).

Table I-3 (p. 168) lists the percentages of 1960 hunters who bought duck stamps in 1961 and 1962. As might be expected, decreases were the greatest in the Mississippi and Central Flyways where regulations were the most restrictive. The decreases are not to be construed as a measurement of actual drops in duck stamp sales since the data do not include recruitment of new hunters during the 2 years.

Tables I-4 and I-5 (pp. 169-170) summarize the percentages of hunters listing each of the possible reasons for not buying a duck stamp in 1962 as those first and second in importance. Hunters in the Atlantic and Pacific Flyways most frequently reported a lack of ducks in their hunting areas during the season as the most important reason for not buying a stamp, while in the Mississippi and Central Flyways the most important reason reported with the greatest frequency was that of too small a daily bag limit (table I-4, p. 169).

The second most important reasons varied among flyways (table I-5, p. 170). In the Atlantic Flyway the lack of ducks during the hunting seasons was still the reason most frequently given indicating that it was either first or second in importance among the greatest number (46%) of the hunters. In the Mississippi Flyway the lack of ducks during the season and the risk of accidental violation by shooting protected species were tied in importance. Of the two reasons, however, the lack of ducks during the season was given more frequently as the most important reason

(table I-4). In the Central Flyway the risk of accidental violation by shooting protected species was the reason listed most frequently as second in importance, while in the Pacific Flyway hunters reported being discouraged by poor hunting in 1960 or 1961 as their second most important choice.

Tables I-6 through I-9 (pp. 171-174) are intended for use as a guide to determine, for a given daily bag limit, at what season length a particular percentage of hunters would prefer a closed season. Specifically, they show the percentages of hunters who, if the daily bag limits were four, three, two, and one duck, would prefer a closed season were it each of the number of days listed (over 70, 70, 60, 50, 40, 35, 30, 25, 20, and 15 days). For example, if the daily bag limit were four ducks in the Atlantic Flyway (table I-6), 63 percent of the hunters would want a closed season if it were 30 days long, whereas only 39 percent would prefer a closed season if it were 35 days long.

It is interesting to note that if the daily bag limit were to be only two ducks, a majority of hunters in all but the Atlantic Flyway (48%) would prefer a closed season to an open season of any length. And if the daily bag limit were to be only one duck, the majority of hunters in all flyways would prefer complete closure to an open season of any length.

Summary

Several points should be considered in interpreting the findings of this survey which are not immediately apparent in the report. First of all, this is a report of hunter opinion at a particular point in time and may be subject to change if hunters become conditioned to restrictive seasons in the future. Further, although over 60 percent of the hunters in the Mississippi and Central Flyways stated, following the 1962 season, that they would have preferred a closed season under the regulations that existed, at least 50 percent of the hunters bought duck stamps. Therefore, even though a hunter states a preference for closed season, it does not necessarily follow that he would not hunt. Of course, some hunters in favor of a season at the time they purchased their duck stamp may have changed their minds following the season; this aspect can not be measured. For these reasons, then, extreme care must be taken when considering the implications of this survey of hunter opinion.

DUCK STAMP SALES

Immediately after the 1962 waterfowl season, a mail questionnaire survey was conducted on the subject of restrictive duck hunting regulations. Names and addresses of approximately 5,000 hunters were selected systematically from hunters who filled out a hunter address card for the Bureau's mail questionnaire survey of waterfowl hunters when they purchased a duck stamp in 1960. A question in this survey asked the hunter if he purchased a duck stamp in 1961 and 1962. The questionnaires that these hunters had returned as part of the 1960 mail questionnaire survey furnished information on their reported hunting activity and waterfowl kill during the 1960 season. This information was available for 2,228, or 80 percent, of 2,785 respondents. Of these, 2087 furnished complete information on whether they purchased

duck stamps in 1961 and 1962. Thus, a direct comparison could be made between the hunter activity and kill in 1960 and whether the hunters purchased duck stamps in recent years (table J-1, p. 175). A tabulation of duck stamp sales by States and flyways for 1961-62 and 1962-63 is given in table J-2, (p. 176).

It is readily apparent in all four flyways that it was the hunter who was most successful in 1960 who continued to purchase duck stamps in 1961 and 1962. In fact, the hunters who continued to hunt in 1961 and 1962 killed about three times more ducks a hunter during the 1960 season than did the hunters who dropped out. The greater kill by the hunters who continued to buy duck stamps was because they hunted more times during the 1960 season, rather than a higher daily kill.

WATERFOWL STATUS AND UTILIZATION ON NATIONAL WILDLIFE REFUGES

Data supplied by Winston Banko and
W. B. Stiles, Branch of Wildlife Refuges,
Bureau of Sport Fisheries and Wildlife

In these compilations showing waterfowl utilization of national wildlife refuge habitat, it will be noted that most of the States commonly assigned to the respective Flyways are represented. It should be pointed out, however, that the listing of national wildlife refuges therein is far from complete, and some word of explanation as to the reason for inclusion of some areas and the exclusion of others is in order (table K-1, pp. 177 and 178).

The primary purpose of the compilations is to show the number of use-days accruing on those refuges wherein duck and goose figures (either singly or in combination) exceed 1 million. Although it is not to be expected that southern refuge areas would show sizeable waterfowl breeding populations and pro-

duction, such numbers as do occur and are known are included in the tabulations. Some of the more northern refuges where waterfowl nesting is normally more abundant are omitted for the reason that overall use is below the standard referred to above. Finally, it should also be pointed out that drought, quantity and quality of food, vagaries of weather, shortcomings and limitations in census procedures, as well as other factors, operating either singly or in combination, may compromise and/or make for considerable differences in waterfowl data gathered on individual refuges over a period of years.

From information gathered over the past 5 years, it is obvious that overall waterfowl use of national wildlife refuges is greatest by far for refuges located in the Pacific Flyway States, followed in order by those in States comprising the Mississippi, Central and Atlantic Flyways.

PACIFIC FLYWAY

WATERFOWL KILL SURVEY

An estimated 1,778,900 ducks were bagged in the Pacific Flyway during the 1962-63 waterfowl season, a decrease of 12 percent from the previous season (table A-5 and A-6). An additional 366,400 ducks were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 2,145,300 ducks.

All States except Nevada and Arizona registered decreases in the total duck bag as compared to the previous season.

Analysis of the total Flyway duck bag by species, as derived from data provided by the Duck Wing Survey, shows that the bags of five species—mallard (558,300), pintail (388,600), green-winged teal (235,200), American widgeon (231,000), and shoveler (116,600)—totaled 1,530,300 ducks or 86 percent of the Flyway bag of all species.

Several species of ducks registered bag increases over the previous hunting season, of which greater scaup (+535%), oldsquaw

(+200%), and scoter (+167%) showed the greatest increases.

The total flyway goose bag of an estimated 234,200 birds increased 11 percent from the previous season. An additional 41,600 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 275,800 geese. All States registered increases in the total goose kill with the exception of Arizona (-50%) and Oregon (-2%).

An estimated 67,300 coots were bagged in the Flyway, a bag virtually unchanged from the previous season. An additional 30,000 coots were knocked down but not retrieved, yielding a total kill (bag plus cripples) of about 97,300 coots.

A total of approximately 239,540 waterfowl hunters were afield during an estimated 1,647,200 hunter-days (table A-7 p.63), registering a 3 percent decrease in the number of active hunters, but a 7 percent increase in total hunter-days from the previous season.

WING COLLECTION SURVEY

Flyway-wide age ratios of the more important species of ducks in the Pacific Flyway kill in 1961 and 1962 are shown in table B-2, (p. 74). Six of the 12 species considered here showed increased numbers of immatures per adult. Most noticeable of these were the shoveler and pintail. Widgeon showed a decline in the number of immatures per adult when compared with 1961. The ratio of immature to adult blue-winged and cinnamon teal (which could not be separated) also showed a

decrease in 1962. Mallard age ratios, which are summarized in table B-2, did not show any important differences between 1961 and 1962.

Species composition in the Pacific Flyway is shown in table B-5 (p. 78). Mallards decreased from 34 to 32 percent of the total kill, while widgeon decreased from 17 percent to 13 percent of the total kill and pintails increased from 18 to 22 percent of the total kill.

WINTER SURVEY

Data supplied by John E. Chattin,
Pacific Flyway Representative, Bureau of
Sport Fisheries and Wildlife

The Alaska winter survey effort has been discontinued because of the insignificant number of birds involved and hazardous flying

conditions normally encountered. British Columbia surveys did not include total coverage of waterfowl habitat but were based on sample areas which could be covered with some degree of certainty annually. Coverage of all other units was essentially complete and comparable from year to year.

In 1961 that portion of Montana west of the Continental Divide was included in the Flyway. In 1962, sections of Wyoming, Colorado, and New Mexico west of the Continental Divide were also included in the Pacific Flyway. Less than 36,000 ducks were recorded in this four-state area in 1963.

It should also be noted that Ross' geese have been included with snow geese in the survey figures. Since 1958 special surveys on the California wintering areas have been conducted in late February to assess populations of Ross' geese. Results of these have been as follows:

| Year | Geese | Year | Geese |
|------|--------|------|--------|
| 1958 | 12,800 | 1961 | 23,050 |
| 1959 | 15,600 | 1962 | 27,920 |
| 1960 | 18,000 | 1963 | 25,253 |

Weather conditions during the 1963 survey were generally good with the exception of some local fog in western Washington and central California. Coverage and comparability of the survey were similar with past years.

BREEDING GROUND SURVEY

ALASKA

Data supplied by Ray Woolford and Henry A. Hansen, Bureau of Sport Fisheries and Wildlife; and Peter E. K. Shephard, Alaska Department of Fish and Game

Weather and Habit Conditions

In marked contrast with a year ago Alaska had a relatively mild winter with very little snowfall. Spring breakup was not early because the most severe storm of the winter blanketed the entire State the last week of March and the first few days of April. The snow cover at this late date kept most lakes icebound well into May with large lakes carrying ice until May 20. By the time waterfowl had started to arrive late in April, however, temperatures had moderated and spring accelerated at a faster pace than had been observed in many years.

Flooding accompanied the breakup in a few areas, but it should have had little or no adverse effect on production as happened in 1962. The flooding was not extensive nor prolonged nor did it occur after the early nesting species started to incubate as was the case last year. Early in May the temperatures everywhere north and west of the Alaska Range as far north as the Brooks Range and out to the Bering Sea rose to 60° or more and remained high with no precipitation. From May 20 to June 1 during the survey there was not a cloud in the sky over all of western and interior Alaska to mar the acceleration of the season. The favorable response of the early

nesting species was evident in the rapidly growing flocks of desert male pintails and mallards.

Breeding Population Indexes

There was a 15 percent decrease in the breeding population of game ducks, both divers and dabblers. Scoters had not yet arrived on the interior breeding grounds at the time of the survey so the indicated decrease of 27 percent in the scoter population is not valid. Following last year's extremely poor production, a decrease this year should have been expected. This was true of all species except mallard, green-winged teal, and canvasback which showed increases. Teal can be discounted because too few are visible from the air. There is no explanation why mallards should have increased more than 35 percent because they had as poor production in 1962 as any other species. Canvasback is a relatively minor species in Alaska but highly visible. They are largely confined to three areas and their pattern of distribution may not be random enough for adequate censusing with the current intensity of the aerial survey.

If the survey in southeastern Yukon and northwestern British Columbia is meaningful there was practically no change in the total breeding population in that portion of Canada, although scaup, mallard, and pintail showed small increases which were offset by losses in goldeneye and bufflehead.

Perhaps the best estimate of conditions for much of the stable interior spruce-muskeg habitat can be gained from an air-ground study on the Ft. Yukon flats by Dr. Calvin C. Lensink, Bureau of Sport Fisheries and

Wildlife. He found green-winged teal up 30 percent, mallard up 25 percent, widgeon up slightly, scaup up 5 percent, and canvasback the same as last year. Pintail were down about 5 percent. In total numbers, all species combined, the breeding population was up 15 percent. Air transects in conjunction with this study, specifically, showed the population to be the same as in 1962 in contrast to the small increase from the ground counts.

Consult tables 1, 2, and 3 in Section E of the Appendix, pages 109 and 110 for a summary of Alaskan data.

Production Indexes

Production of all species of ducks from Alaska will be much improved over that of 1962. Brood surveys comparable with last year were conducted between July 15-20 on two major areas of the interior spruce-muskeg habitat. On the extensive Fort Yukon Flats (Rampart Impoundment Area), Dr. Lensink found 25 percent more broods than last year with the average size of class I broods up from 6.6 to 6.9 young.

In the Tetlin-Northway area adjacent to the Canadian border, the same number of broods as last year were present but the average size of class I broods was up from 5.1 to 7.6 ducks. This is an area of very stable habitat none of which was subjected to the severe flood loss found elsewhere in 1962. Therefore, last year's nesting success from the Tetlin area was better than in other areas and could be expected to reflect less of an improvement this year. The greater average brood size is one indication of the generally improved season in 1963 in conjunction with an earlier hatch. During the July census period 70 percent of the broods were class I, 20 percent class II and 10 percent class III in 1962. In 1963 by way of comparison only 45 percent were class I but 35 percent were class II and 20 percent were class III. The habitually late nesting scaup and scoters were more than twice as abundant in the 1963 (July) census than the same date in 1962.

Until the August census is completed for late broods a more accurate determination will not be possible. But as of the late July census for both study areas combined, which very well may be quite representative of Alaska as a whole, broods were up 17 percent and total production up 28 percent above last year.

As previously reported there will be little or no black brant production. Over 4,000 brant were trapped in two drives and there were no young among them although many adult females with brood patches were examined. There may have been some loss of cackling geese where the nesting grounds of the two species overlap but the loss would not have been great inasmuch as the wind-swept tide did not reach as far as the optimum cackler habitat. The other subspecies of Canada geese and white-fronted geese should have prospered with the good weather to the same extent as the ducks.

Conclusions

The outlook for production from Alaska is exceptionally good for 1963.

SPECIAL STUDIES²

Weather and Habitat Conditions

Extremely warm weather beginning in late April and continuing through most of May provided conditions which were highly favorable for a rapid development of waterfowl habitat over most of the State. High waters reached a peak nearly 2 weeks earlier than usual, but were not of sufficient force to move heavy accumulations of ice from many of the larger lakes until May 20 to 24. Water levels began to drop in late May and continued to fall all summer.

An accelerated development of vegetation accompanied the warm and early spring—a phenological feature which is generally indicative of a good production year. The appearance of deserter male flocks early in June suggested at least a 7 to 10 day advance in the seasonal phenology. Prospects for the best production year in the last 3 years were good to excellent.

Breeding Pair Censuses

Ground breeding pair censuses were conducted at Minto Lakes from May 28 to June 7, 1963. Conditions for the ground counts were nearly the same as in 1962, although there was more water in some areas prior to the 1963 census. These counts revealed a breeding drake population of 54.0 males a square mile. This figure was not significantly different

²Data supplied by E. K. Shepherd

from the 1962 count of 56.5 drakes a square mile.

Nesting and Brood Progress

Sex ratio counts of dabblers in deserter drake flocks suggested that most species, with the exception of shovelers, were experiencing a good production season. In late June approximately 50 percent of the mallards, pintail, and green-winged teal were still incubating or with broods. The appearance of only one shoveler brood during the first brood survey again suggests that this species' first nesting attempts may have failed.

The only diver which provided sufficient counts to evaluate for nesting progress was the scaup. Sex ratio counts of this species indicated a poor production year at Minto; however, scaup are late nesters and a substantial hatch might appear late in July.

Brood Surveys

The first pintail brood was observed on the Minto study area June 14. The following week many more pintail and mallard broods became evident. A ground count over previously established check plots revealed a density of 3.5 broods a square mile. With approximately half the broods hatched at that time the final figure for 1963 should approach 7 broods a square mile. This will equal or slightly exceed the 1962 figure of less than 7 broods a square mile.

The most encouraging feature of the 1963 brood counts was the brood size (table F-1, p. 135). This exceeded the mean brood size for all species over the past 3 years by nearly one duckling. A large brood size is one of our best indicators of a good nesting and brood season.

Forecast

A better fall flight of dabblers than in 1962 is definitely expected on the basis of sex ratio counts and brood surveys. Some local, but slight, reduction in divers may occur if a late hatch fails to materialize. Overall, a much cheerier production picture for Alaska is in the offing this year.

Black Brant Production

Better than average weather conditions enhanced the progress of the 1963 black brant

nesting season until late June. On June 22 a northwest storm completely inundated the black brant nesting habitat for at least one tide. A conservative estimate of the losses from this storm would be 80 percent of the annual production or 30,000 to 40,000 brant based on a fall population of 180,000 brant. Consequently a very poor fall flight of local brant is expected to depart Alaska.

Progress of the Nesting Season

Black brant investigations were conducted on the Yukon-kuskokwim Delta as a continuation of studies begun in 1961. All indications from the start of incubation, which was 1 week earlier than in 1962, pointed to a good nesting season. The weather from the onset of egg laying and incubation was warm and mild, continuing until early June. On June 20 a series of low pressure areas moved into the Bering Sea bringing rain and northwest winds of light gale force. Unfortunately, at this time the highest tides of the month were expected and the high tides of June 22 rose to an unpredicted height. This inclement weather continued for nearly 2 weeks with a second storm of about the same intensity starting a week later. As a consequence of these storms the entire nesting habitat of the black brant was inundated completely for at least one tide during the first storm and may have been covered at other times.

Nesting Study Area Survey

Prior to the June 22 high tides a complete check of the Kashunuk River study area was completed (table F-2, p. 135). A slight decrease in the number of nesting brant was revealed, but not enough to suggest a significant change in the breeding population. Clutch sizes were the same as in previous years and before the storm averaged 3.6 eggs per clutch. The state of incubation of most clutches indicated the peak of the hatch would have occurred between June 23 and 27.

Evaluation of the Storm Damage

Early in the morning of June 22 it became apparent that the steady northwest winds were causing extreme high tides on the coastal flats. In order to observe the effects of these high tides two flights were made over the nesting habitat of the brant. The first flight was at

3 a.m., June 22, and the second was at 1 p.m., June 22. Both flights were made in a Fish and Wildlife Service Cessna 180 piloted by Refuge Manager, James G. King.

The midnight tide of June 22 had receded by the time the tidal flats were reached; however, it appeared that little damage had occurred during this tide as there was no drift scattered about the nesting flats. The second flight was made along the entire nesting area from the Kashunuk River to Hazen Bay at the peak of the storm tide. Extensive windrows of debris consisting of huge logs, sticks, thousands of eggs, and downy brant covered the drift line above the level of the nesting flats. Very little, if any, of the nesting habitat was above water and most was covered with a foot or more of sea water. There was little doubt that nearly all brant nests along the coastal flats were completely or partially inundated for part of this tide. A conservative estimate of the losses from this storm would be 80 percent of the annual production of 30,000 to 40,000 brant based on a fall population of 180,000 brant.

On June 23 a ground check was made over the Kashunuk study area. The damage wrought by the storm tide was appalling—eggs of black brant, cackling geese, common eider, and other species lined the beaches in windrows. Examination of these eggs proved that many were pipped or in late stages of incubation. Downy brant, either drowned or dead from exposure, were scattered along drift lines or in abandoned nests. Brant were noted incubating pipped eggs, but most contained dead embryos; however, some eggs that were obviously covered for part of the storm tide contained live embryos that were hatching.

One hundred and two nests of black brant, cackling geese, spectacled eider, emperor geese, and oldsquaw were rechecked of the 390 nests found previously. Many of the completely destroyed nests were never found, thus biasing these figures toward the surviving nests. Of the rechecked nests 43 percent were destroyed outright. The average clutch size of the remaining nests were reduced from 3.6 eggs to 1.9 eggs a nest. Moreover, it was apparent that many of the remaining eggs would not hatch because of chilling and desertion. A final check of the study area on June 30 revealed practically no active nests nor any sign of renesting attempts.

Aerial brood censuses conducted over previously established transects provided fur-

ther evidence that the nesting losses were extremely high. A comparison of 11 transects suggested that the 1963 brood production was 26 percent of the 1962 counts. The only transect which even approached 50 percent of the 1962 brood count was the one covering the Kashunuk study area which is higher than most of the remaining brant habitat. Ground brood counts on the Kashunuk River at hatching showed a reduction in brood size from 3.5 young in 1962 to 2.9 in 1963. The average brood size as observed from the air was 2.1 goslings compared to 2.9 in 1962.

Forecast

A poor fall flight of local black brant is expected.

NORTHERN ALBERTA, NORTHEASTERN BRITISH COLUMBIA, NORTHWEST TERRITORIES, AND YUKON

Data supplied by Robert H. Smith and
Joe M. Matlock
Bureau of Sport Fisheries and Wildlife

Weather and Habitat Conditions

Breakup occurred on an average of 10 days earlier than normal throughout the survey area. Except on or near the barrens only the large deep lakes were ice bound during the time of the survey. During the same period there were no protracted spells of precipitation but showers of rain or snow were encountered almost daily. On May 29 a heavy, wet snowfall occurred at Fort Nelson, British Columbia, lasting throughout the day. On the following day over the route to Fort Smith the ground was white with snow about half way across. This snow and accompanying freeze was general throughout the northwest and Tom Barry, Canadian Wildlife Service, reported goose eggs being frozen in the nests at the Anderson Delta.

Surface water conditions in stratum 1.1 were improved over a year ago as they were in the adjoining parklands. Otherwise, throughout the north water levels were lower than in 1962 with area of surface water remaining practically constant.

There has been no major flooding of the deltas, although usual spring high water following breakup occurred in both the Athabaska and MacKenzie Deltas. The flooding of the town of Hay River at the mouth of the Hay on Great Slave Lake was a local situation caused by ice jamming during breakup.

Weather encountered north of Yellowknife during the period July 20 through August 5 was extremely poor for flying as well as for duck production. Apparently an Arctic front became stationary along the Arctic coast of Alaska extending through the Old Crow Flats, the MacKenzie Delta and on into the Great Bear Lake region. Frequent waves surged along this front bringing low clouds, rain and high winds at about 36 hour intervals so that the clearing periods were very brief. One such surge covered the Carcajou Mountains with snow on July 21 and on August 5 it was snowing heavily along the Yukon coast. This extended period of foul weather occurred during the critical hatching time of late nesting scap and scoters.

Late high water on the Peace and the MacKenzie Rivers, though not of flood proportions, flooded the lower basins and sedge meadows of the Athabaska and MacKenzie Deltas. Undoubtedly, this would adversely affect late nesters occupying the lowest sites.

Area of surface water and number of water areas remained constant throughout the northern nesting areas—a normal condition from year to year.

Breeding Population Indexes

Duck populations decreased in all strata except the two most southerly and in stratum 4 (tables E-4 and E-5, pp. 112-113). Decreases in strata 3 and 7 were so minor as to be considered in the "no change" category. So also was the overall duck population, at a recorded 2 percent. Increases were to be expected in the two most southerly strata having improved water conditions and being adjacent to and partially composed of parkland habitat. Also, expected decreases in the north because of a residual duck population being siphoned off by improved conditions in the south. Consequently, a recorded increase of 24 percent in stratum 4 remains somewhat of a puzzle. Likewise, some of the variations in increases and decreases among species cannot be readily explained. Why, for example, mallards should increase while pintails show a decrease or why baldpate should decrease

and green-winged teal double their numbers remains a mystery. Some of the really startling figures such as a 258 percent for canvasback and 658 percent for ruddy ducks point up the possible errors involved when attempting to measure numerically minor species in the survey area.

A perusal of table E-4, p. 111 will indicate the numerical status of each species and each stratum and percent change from 1962. As pointed out previously, some of the changes in percentage of the numerically unimportant species are probably not reliable. This applies to geese as well. A sampling pattern was set up to measure an evenly distributed duck population rather than an irregular and spotty goose distribution. The swan index, even though small, is reliable because of a constant and even distribution over their chosen habitat.

Due to zero visibility conditions we were unable to survey the snow goose colony on the outer delta of the MacKenzie.

Production Indexes

What effect, if any, the unseasonable freeze of May 29 will have on early nesting mallards, pintails, and geese remains to be seen. Certainly it could have no effect on the majority of ducks which had not yet begun nesting activities. Other than this, conditions appear to be favorable. Tom Barry (CWS) reported an unusually early nesting of snow geese from the Anderson Delta, which is usually a good indication of good production. If the season remains dry, as it has started out to be, a good hatch can be expected from a nearly static duck population.

The last column in table F-3, p. 136 indicates the status of each stratum as compared with 1962 based on the total number of broods seen. Strata 2, 3, and 6, the Athabaska Delta, the forest area south of Great Slave Lake and the Precambrian Edge show increases varying between 470 and 25 percent. All other strata, including everything north of Great Slave Lake with the exception of the Precambrian Edge, decreased between 27 and 54 percent. These decreases indicate a continuing decline in production noted for several years. Considering all areas together this decline is of small magnitude (6 percent) as compared with the total number of broods seen during 1962. Average brood size, the three classes considered together, was practically the same as in 1962, although class III

broods decreased an average of 1.2 ducklings a brood. It will also be noted that the number of single ducks, the pairs, and groups of 3 - 10 which might possibly be class III broods or flying young decreased from the numbers recorded in 1962. At this time of the season single ducks or pairs have no significance as to being indicators of production to come. The only valid measurement is the actual sight of a brood—even maternal hens can seldom be identified as such from a fast moving aircraft.

The increases in broods recorded in strata 2, 3 and 6 are contrary to the trends established during the May - June population survey. Weather—especially wind velocity has a tremendous influence on brood visibility. Consequently, this may be measuring the factors affecting brood visibility rather than the magnitude of the hatch. To compensate for this assumed error the transect is run twice in this principle work area. However, often less broods are seen on the second run than on the first run, which is contrary to the facts. This proves the point but fails to solve the problem.

Adverse weather during the critical period of the scaup hatch could have accounted for the poor showing north of Great Slave Lake. This must be assumed in the absence of basic research. Late flooding of the low basins of the Athabaska and MacKenzie Deltas probably also adversely affected late nesters—at least very little was visible on the MacKenzie Delta during repeated coverages at the time when scaup broods should be very much in evidence.

The data on coots and geese are too meager to attempt to draw any conclusions. Coots are found only on the Athabaska Delta and the sampling pattern is geared to ducks rather than geese.

Conclusions

In summary, the number of broods recorded increased in the three most southerly strata but decreased in the north, resulting in an overall decrease of 6 percent for the entire survey area. This decrease represents a continuing downward trend in duck production in the Northwest Territories and Yukon. Average brood size, the three classes considered together, remained almost static but class III broods averaged 1.2 ducklings less than in 1962. Weather, during the critical hatching period of scaup, was unfavorable and

late flooding of the deltas probably adversely affected late nesters as well.

SOUTHERN ALBERTA

Data supplied by G. Hortin Jensen and
Alva E. Weinrich, Bureau of Sport
Fisheries and Wildlife

Weather and Habitat Conditions

Last summer some signs were apparent that drought conditions might be waning. Varying amounts of moisture fell over the Province of Alberta and the heaviest precipitation occurred in central and northern areas. By early fall the soil moisture situation had improved and was the best recorded during the recent drought years. As will be observed in several instances, southern Alberta must be excepted. This area still recorded sub-surface reserves low or lacking. Fall precipitation was measurably better than 1960 or 1961 but was still below normal conditions.

This more favorable situation of early fall was offset by lack of precipitation during late fall and winter. Loss of moisture continued during this period, so as winter set in, dry soils were again evident in southern Alberta.

Last winter was characterized by light snowfall except in northern and central Alberta. Areas south of the Red Deer River were largely without snow during the winter months. Snowfall was good in the parklands. Transition from winter to spring was very gradual. Under these conditions runoff is poor and moisture percolates into the soil rather than into pothole basins.

Fortunately, April storms helped fill the moisture gap for the first time in several seasons. However, during April a similar pattern of precipitation deficiency in the south and above normal precipitation in the north was recorded. These values ranged from as little as half of normal to over twice the normal amounts of moisture.

As we approached the current waterfowl nesting season surface and subsoil moisture conditions had improved in the parklands and northeastern prairie while southern areas had suffered significant losses. The impact of these general habitat conditions is reflected in the summarization of pothole data from the survey area which is presented in table D-1, p. 104.

The relative number of potholes this year is only 5 percent below average numbers and has increased 61 percent from 1962. This improvement is due to a large increase this year of stratum B water areas. From last year the number of water areas increased 74 percent. Stratum A showed a marked increase in numbers from last year being up 43 percent. This is the result of improved conditions of the northeastern part of stratum A. The southern and western portions of this stratum are lower in water areas than last year. The general situation since last summer should have resulted in less water in stratum C this year. Instead stratum C also increased by 21 percent over the respective 1962 index. Our explanation for this anomaly would be that early use of irrigation water biased data from the current season and caused a higher index. Also, local conditions and rain in May in the Cypress Hills of southeastern Alberta just prior to the survey effected an increase in stratum C water areas.

Many of the new water areas were grown over with vegetation at the time of the breeding pair survey—an event usually reserved for the July period. This would indicate shallow depth and poor quality of water. During the survey period rainfall was below normal in Alberta. We will need recurrent rains in June and July to insure tenure of our new water in the northeastern prairie and southern parklands. Water areas in the northern parklands are in good condition and will persist. The drought problem will be with us in the southern part of stratum A and all of stratum C throughout the current season and waterfowl habitat will be in poor condition.

Recurrent summer rains have done much to maintain existing water conditions as well as being excessive enough to cause increases in the numbers of potholes from May counts. Rains of June were particularly heavy in stratum C. Upwards of 10 inches of rainfall were recorded. The southern parklands and some areas within the prairie received late June rain with heavier amounts in July. The parklands north of Edmonton have dried to a degree with the advent of summer but not enough to present hazardous conditions. There are still large areas within the prairie that are capable waterfowl producing areas but are still dry or far below normal potential.

The improved conditions recorded in May have persisted or have improved as summer has progressed so that sufficient brooding habitat was provided (table D-1, p. 104). Com-

parative water data for May and July record plus values in 1963 in all categories. These values range from 21 to 74 percent. Comparing the current season with long-term water trends for May strata A and C are still below average by -38 and -39 percent. In May the parklands showed a 20 percent increase in potholes. Numbers of ponds in July showed similar trends. Large increases were recorded in comparison with 1962 as well as from average conditions, except that stratum A is 15 percent below the 12-year average and stratum C is 5 percent above average.

Improved habitat conditions are indeed gratifying when compared to the droughted conditions of the past few years, but a paradox exists. Some potholes, formerly excellent waterfowl producers, are still dry in the face of excessive rainfall. Their return to production will undoubtedly come if the trend in rainfall continues upward and habitat becomes more stabilized to these conditions. Our improved July counts could also reflect seasonal water from recurrent rain and these would not persist in normal years whereas older established potholes would.

Breeding Population Indexes

The trend of the waterfowl breeding population indexes for the past 10 years is summarized in table E-6, p. 114. The status of these waterfowl species is compared with stratum and provincial differences from the past year and long-term averages in table E-7, p. 115.

Comparison of total indexes since 1954 shows that they are still influenced by substandard breeding conditions. These apparently are closely associated with drought conditions within the survey area particularly in southern Alberta. The 1963 index is 23 percent below the long-term average, while 5 years ago it was at the crest of populations showing increases from average conditions of 29 percent. The highest index 3,399 (1954) is 68 percent above the current index of 2,019.

More current comparisons, this year and last year, show indexes of breeding ducks increasing in almost every species. Increases for dabbling ducks, diving ducks and total ducks were 14, 20, and 13 percent, respectively. The most notable changes from last year are as follows: (a) The principal species of diving ducks—redheads, canvasbacks, and scaup have increased; (b) pintails

increased 46 percent, and shovelers 53 percent; and (c) mallards and other lesser dabbling ducks remained nearly constant with last year's indexes. It must be remembered that these comparisons are the lowest recorded and increases this year must be compared with average numbers to evaluate their correct worth.

When compared with long-term averages, indexes for 1963 were low by 26 percent for dabbling ducks, 2 percent low for diving ducks and 54 percent low for scoters. In aggregate this decrease was 23 percent. Contrary results were registered by three species: gadwalls increased 2 percent; shovelers increased 9 percent; and lesser scaup, particularly abundant in northern parklands, increased by 8 percent.

Total index for parklands this year indicates that breeding populations are back to average conditions. This is not so for the short grass prairies where total indexes are still 50 percent below the average value.

Coots are sensitive to water conditions. Where coots are found water can be expected to persist throughout the season. The return of water and coots to some areas may be considered good signs. The current index for coots increased 165 percent over the 1962 index. This increase was directly associated with areas where water conditions improved, primarily in the parklands and secondarily in the northeastern prairie. Present index for coots is still 30 percent below normal. Coots were not recorded present in stratum C during the survey period.

Early seasons have been relatively mild this year. Lack of snow allowed for an early spring. As such, waterfowl breeding cycles were not delayed in any fashion. Mallards and pintails began nesting activities in mid-April. The lone drake index, as summarized in table E-8, p. 115 gives evidence of these conditions. Results of the breeding pair survey recorded 85 percent of mallards and pintails as lone males. The canvasback lone male ratios were near the highest recorded. The only facet lacking to confirm an early season was the failure to record a few broods along regular aerial transects. However, in late May broods were appearing and had been recorded by ground study crews.

Phenologically vegetation was behind previous years. This was perhaps due to the cooler than usual late April and May temperatures. Aspen were half to three quarters leafed during the survey flights over the parklands.

Production Indexes

The relation between water and ducks is not always in direct proportion. The new water from summer rain proved of little value to breeding populations. Breeding pairs had already committed themselves for the current season. Those that stayed to nest under spring conditions were assured of good to excellent brooding habitat. The summer habitat was not filled to capacity because in the spring the sceptre of continuing drought was evident in southern Alberta. Northern parkland habitat was near optimum condition and was successful in providing excellent areas for breeding waterfowl pairs and their production of broods.

Compared to last year the total brood index (tables F-4, F-5, pp. 137, 138) increased from 131,000 to 202,000, an increase of 54 percent. This is still below average conditions by 15 percent. The number of broods increased in all strata from last year. This increase was 82, 50, and 20 percent, respectively, for strata A, B and C. Because of number of broods involved the parklands remain the backbone of the current production. If waterfowl populations are to regain their higher former position, the short grass prairie must also come back into production. This was accomplished to some degree this year.

Coots were much more evident in the spring counts than in 1962. However, the coot brood index showed no change in numbers of broods and the current brood index is 62 percent below average. Apparently, some adult coots failed to nest as some were observed without broods on small potholes during survey flights. Also, on occasion flocks of adult coots were noted on larger lakes. Perhaps more time is needed for the coots to adjust to improved habitat conditions.

Our late nesting index for the past few years has been represented by small index numbers. Therefore, it is improper to draw any conclusion except to state that it is quite low and is 60 percent below an 8-year average. Incidence of class I broods was low compared to class II and III broods, being less than 5 percent of the total.

A successful first hatch is paramount for a good production year. Phenologically this season was normal. Young mallards and pintails were flying late in the survey period.

Conclusions

Survey flights were concluded within appointed dates. Clouds caused overcast skies and cooler days but only 1 day was lost because of shower activity. Excessive wind forced a 1-day delay.

Progress of nesting season would be considered early to near normal. Mallard and pintail males in groups as large as ten males were evident during early May. This condition in lone males remained static and the smaller groupings below five were usual during the survey period.

Index of total numbers of water areas has increased 61 percent from 1962 and is only 5 percent below average.

Habitat conditions have improved in the northern half of the survey area with the northern parklands being the best. Improvement of habitat conditions was noted in northeastern prairies but elsewhere conditions remain poor for nesting ducks. Irrigation districts could ameliorate this condition in those areas.

Breeding populations have responded to improved habitat conditions. A 14 percent increase was recorded over last year. The total index is still 23 percent below the long-time average.

Mallard indexes are low by 20 percent and the population did not increase over last year in spite of better habitat conditions.

Pintails have recurred in significant numbers and increased 46 percent from 1962. They remain 41 percent below the average.

There was a general increase in diving ducks this year over last year and totals are near normal because scaup were abundant in the northern parklands.

Shoveler, gadwall, and scaup indexes are as high or higher than long-time average data. All other species are below with some as great as 50 percent.

Coots have reappeared on the improved habitat. Their increase from last year is 165 percent. However, the coot index remains 30 percent below normal.

If improved habitat conditions can be maintained by recurrent summer rain, waterfowl populations should increase over last year. They will not, however, approach average levels.

May surveys revealed an increase of 14 percent in breeding populations over last year and a decrease of 23 percent from the long-time average.

General improvement of habitat noted during May surveys continues through July because of recurrent rains.

These improvements caused an increase in brood indexes from last year. This change was a 54 percent increase over 1962 and a 15 percent decrease from the long-time average.

The coot brood index showed no change from 1962 and is still below average by 62 percent.

Renesting is low and will not be an important factor affecting early nesting waterfowl species.

Phenologically the season is normal.

Visibility of broods was difficult during the July surveys. Low spring water levels were conducive to excessive growth and emergents and aquatics, once started, remained ahead of increases in water depth.

There was a notable exodus of adult ducks from the southern prairies as observed during the July survey.

Available brooding habitat was not filled to capacity.

The index is 104. This is higher than last year but lower than the average.

From the survey area a significant increase in the fall flight is expected. This increase could approximate 50 percent.

Conditions are set for a good carry-over of potholes in much of the waterfowl breeding habitat in central and southern Alberta.

WASHINGTON

Data supplied by Robert G. Jeffrey
and J. Burton Lauckhart, Washington
Department of Game

Weather and Habitat Conditions

Conditions for duck production were much improved in the far eastern potholes, due to a rapid runoff which refilled the potholes. Although nesting pairs were fewer in this area, nesting success was up 114 percent over last year. Counterbalancing this, pothole numbers in Douglas and western Okanogan Counties were 20 percent fewer in number this spring, continuing the drying trend of the past several years.

Breeding Population Indexes

The breeding pair index for the irrigated areas shows a decline of 19 percent. However, a brood count in a part of the area showed a 116 percent increase over last year. For the entire central unit a 58 percent increase is predicted (table F-6, p. 138).

Production Indexes

Mallard production is expected to be up, while blue-winged and cinnamon teal suffered a state-wide decline. Also, in some areas, diving ducks were down.

Canada goose production is 17 percent higher than the 8,400 index of 1962, or a 9,800 index for 1963 production.

Conclusions

Indications are that duck production in the State will be up moderately. Canada goose production will be substantially increased, while coot production will be much below that of 1962.

OREGON

Data supplied by Chester E. Kebbe
Oregon State Game Commission

Weather and Habitat Conditions

The drought, which has affected the major waterfowl production areas of southeastern Oregon since 1959, has apparently broken. A heavy snowfall in early spring, continued cold weather, and above normal precipitation has restored water to most lakebeds, marshes, and potholes, again creating ideal production habitat.

Even though much of the duck production in Oregon is concentrated in the large marsh areas, a considerable number of broods are raised along all waterways in the State. Water levels in these areas have also returned to normal.

Production Indexes

Measurements of waterfowl production over established transects are presented in tables F-7, F-8, and F-9 (pp. 139 and 140).

Goose production continues high with 3,399 goslings counted on sample areas as compared with 3,254 in 1962, an increase of 4 percent.

Duck production on these areas, however, indicates a continued decline in production of young. Only 3,810 ducklings were counted as compared with 4,457 in 1962, a decrease of 15 percent.

Duck production on Malheur Refuge, which is not included in the tables, should be considerably improved over 1962, due to the improved water conditions. The 1963 breeding index forecasts a production increase of 85 percent; from 16,700 ducklings in 1962 to 30,915 in 1963.

Conclusions

During the drought waterfowl concentrated on the remaining marsh areas where most of the permanent transects are located. Despite the influx of these foreign ducks which loaded the samples, the number of ducks recorded breeding on these areas continued to decline from the peak reached in 1959.

With the drought now apparently broken, and water returned to most of the potholes, lakes, and marshes the birds dispersed and again are raising broods on these restored areas. Loss of birds from permanent areas is more than compensated for in increased production in restored habitat.

In spite of a decline of 15 percent in duck production on permanent water areas, the restoration of a large amount of waterfowl habitat with a dispersal of ducks indicates a production above that recorded in 1962.

Goose production remains high, and compares favorably with the 1962 census.

CALIFORNIA

Data supplied by J. R. LeDonne, F. M. Kozlik,
Harry George, William Anderson
California Department of Fish and Game

Weather Habitat Conditions

Water conditions in northeastern California were nearly normal this year. There was great improvement over the last 4 years, with above or normal rainfall and snow pack in much of the area. These conditions were beneficial to this area, although some flooding of nests did occur.

The Central Valley received normal or above normal amounts of rainfall over the entire area. Cool weather prevailed during May and June. The rice and associated vegetation was 2 to 3 weeks later than 1962, mainly due to late rains that retarded rice planting.

Production Indexes

Comparable data on nesting pairs of waterfowl are presented for the various survey areas in tables F-10 and F-11 (p. 141).

The Sacramento Valley area showed an increase of 29 percent in breeding pairs and total fall population of ducks. The coot population increased 77 percent from the 1962 count. Data from Suisun Marsh indicates an 85 percent increase in breeding pairs and 62 percent in the total fall population of ducks. This area had over a 500 percent increase in the total fall coot population. Breeding pairs and total fall population of ducks in North San Joaquin Valley were up 35 percent over 1962 and coots were up 25 percent on pairs and 43 percent in fall population. Breeding pairs of ducks in South San Joaquin Valley were down 13 percent and the fall population index down 63 percent; Coots were 42 percent below 1962. In northeastern California the number of pairs of Canada geese increased 82 percent while the fall population index was up 57 percent. The fall population increase resulted largely from non-breeders from last year's high production. There was a 96 percent increase in breeding pairs and also in the fall population index on ducks. Coots showed a 69 percent increase in northeastern California. The Klamath Basin, a major nesting area, had a 15 percent decrease in breeding pairs of Canada geese and a 7 percent increase in the fall population index. Breeding pairs of ducks increased 75 percent while the fall population index indicated a 10 percent increase. Coots showed a decrease of 26 percent in breeding pairs and fall population index.

Conclusions

Statewide, this year's surveys indicate a 35 percent increase in the breeding pairs of Canada geese and a 39 percent increase in fall population index. For ducks, there was a 49 percent increase in breeding pairs and a 34 percent increase in fall population index. Coots showed a 42 percent increase.

NEVADA

Data supplied by C. V. Oglesby
Nevada Fish and Game Department

Weather and Habitat Conditions

Water and habitat conditions showed continued improvement again this year in Nevada. A very poor winter snow pack and an extremely poor outlook for stored water was offset by large amounts of precipitation occurring during April and May. June precipitation was considerably above normal and along with heavy late spring runoff, helped to restore most marsh areas throughout the State. Continued runoff from near normal mountain snow packs should be sufficient to maintain reservoirs and marshes through most of the summer.

Habitat conditions improved significantly in the important waterfowl production areas of Lahontan Valley (including Stillwater Marsh) in west-central Nevada. This area has been adversely affected by drought for the past 4 years. Water conditions in all marshes and reservoirs located in northeastern Nevada were near normal and in some cases provided optimum nesting habitat.

Breeding Population Indexes

The breeding ground survey for 1963 was conducted in the same manner as in previous years. Complete aerial coverage was made of all important marsh and reservoir habitat. Approximately 600 lineal miles of river transects were also covered by air.

Nesting pair data recorded during aerial surveys are presented in table E-9 (p. 116). These data indicate that duck breeding populations were up 53 percent over those recorded in 1962. Increases were noted in all major species with the most significant increases occurring in redheads (up 87 percent) and gadwall (up 64 percent). Population increases this year, particularly in divers, are attributed to the partial restoration of drought-stricken marshes. There was no significant change in the Canada goose breeding population.

Production Indexes

Duck production for Nevada as determined by trends in numbers of young produced on

comparable areas shows an over-all increase of 10 percent. The abundance of late hatched broods observed during July surveys indicates an extremely late nesting season and considerably more improvement in duck production is anticipated than is evident at this time. Canada goose production showed a decrease of 27 percent from 1962. Table F-12 (p. 142) shows production trends for the years 1959-63 on comparable trend areas. Number of broods classified and average brood size by species is presented in table F-13 (p. 142).

Conclusions

It is anticipated that the contribution from Nevada to the fall flight of ducks in the Pacific Flyway will be the highest since 1959. Since the majority of Canada geese produced in this State remain as resident birds, the decrease in goose production this year should not affect other areas within the Flyway.

UTAH

Data supplied by Donald A. Smith
Utah Department of Fish and Game

Weather and Habitat Conditions

The fall and winter period of 1962-63 was exceptionally dry in Utah. It appeared as though the relief received in the spring of 1962 from several years of drought was temporary, and that once again there would be a depression phase of the water cycle. During February and March 1963, there was snow and rain to the extent that many reservoirs which had been dried during the preceding irrigation season were filled to capacity and were spilling water into streams and other catchments. Cool weather and rains persisted into June and all waterfowl management areas, Federal refuges and most natural marshes were filled and maintained in excellent condition.

The cool, wet cycle broke in mid-June, and conditions at this time (mid-July) are somewhat discouraging. It is not anticipated that water shortages now occurring will significantly influence production of ducks, but they will affect the fall migration through Utah if they persist. At this time, Farmington Bay Waterfowl Management Area in Davis

County, Utah, is in poorest condition, with daily losses of water in all units. Other areas are expected to follow this trend unless some relief is forthcoming.

Breeding Population Indexes

Ducks were censused by both aerial and ground means in Utah. Some 108.6 square miles of breeding habitat were surveyed by aerial methods. Transects through habitat censused in this manner were established during earlier surveys and were traversed again in 1963 to obtain comparable breeding duck information.

Aerial survey data indicated an increase of 13.9 breeding ducks a square mile in 1963 from the previous year. The 1963 index was the highest recorded since 1956 and is 4.7 breeding ducks a square mile above the 10-year average for the area covered (table E-10, p. 116). The increase was general, being reflected in each of the various segments of the survey area; however, the most significant increase was noted in Davis County where breeding ducks nearly doubled from 1962.

Ground counts of breeding ducks are made annually on waterfowl management areas. These data are recorded in table E-11 (p. 117). The three areas censused for comparative purposes in northern Utah are: Ogden Bay, Farmington Bay, and the Public Shooting Grounds Waterfowl Management Areas; all areas showed significant increases in breeding ducks. The 47 percent increase on Ogden Bay was greatest of the three areas and cinnamon teal and shovelers were responsible for much of this increase. Clear Lake Waterfowl Management Area in central Utah did not follow this trend, dropping 43 percent in numbers of breeding ducks from 1962. The decline on this area was fairly constant through all species, but was most noticeable in the 65 percent drop in redheads.

Species composition information for the State is broken down into two units: northern and southern Utah. This distinction is made because of habitat differences between the two sections and the consequent variance in species of breeding populations. It can be noted in table E-12 (p. 117) that redheads were down from 1962 in both units, and gadwall and shoveler increased. Other species varied up and down from one section of the State to the other.

Production Indexes

Production of Canada geese in Utah is measured by brood counts. These counts are made both by aerial and ground methods. Ground counts are made on management areas and on various lakes and reservoirs through the central portion of the State. Aerial counts are made in Rich and Cache counties in northern Utah.

A significant increase in the number of broods and in goslings produced was noted throughout the areas censused. In 1962, a total of 737 broods containing 3,559 young were counted. Comparing these same areas in 1963, it was found that 809 broods were produced which contained 3,938 young. This is an increase of approximately 10 percent in the number of broods and 11 percent in the number of young from 1962. Canada goose production data are contained in table F-14 (p. 143) of this report.

IDAHO

Data supplied by Elwood G. Bizeau
Idaho Fish and Game Department

Weather and Habitat Conditions

Following the driest fall and winter in recent years, Idaho received copious amounts of moisture beginning in late March and continuing through June. Precipitation during June over most of southern Idaho was more than 200 percent above average (U.S. Weather Bureau records). Irrigation reservoirs were at or near capacity with ample water assured for the waterfowl production season.

With extremely mild weather prevailing, the spring movement of waterfowl had no sharp peak period. Waterfowl dribbled through the State from March to May. The pintail concentration at Market Lake in eastern Idaho which normally occurs in early April had no outstanding peak this year.

Due to lack of snow and above-normal March temperatures, goose and mallard nesting throughout southern Idaho began 2 weeks earlier than normal.

Breeding Population Indexes

Aerial trend counts were conducted on all major goose nesting units for the ninth consecutive year.

Total geese counted for all units combined were 37 percent above 1962 and 55 percent above the 1955-1962 average. Major increases were recorded for the Gray's Lake and Dingle Marsh units (table E-13, p. 118). The only unit in the State which had a reduction in breeding season numbers was the Mud Lake-Camas NWR area where flooding virtually wiped out production last year.

Production Indexes

Goose nesting surveys were conducted for the twelfth consecutive year. Results are based on number of goslings produced on identical areas surveyed in the same manner each year. For all six Idaho units combined, gosling production was up 24 percent from 1962 and 36 percent above the long-term average (table F-15, p. 143).

The resident goose flocks of southwest Idaho had an outstanding year while the migratory flocks of southeast Idaho had mixed success. Production for the southwest area was 25 percent above 1962 and 50 percent above the long-term average.

Increases were recorded for three of the four southeast Idaho units from 1962 to 1963 but the only southeast unit which registered well above its long-term production norm was Blackfoot Reservoir. For the second consecutive year, almost complete production failure was experienced at Mud Lake due to nest flooding caused by an adverse change in water storage practices. For the four southeast units combined, gosling numbers were up 21 percent from 1962 and 12 percent above average.

Duck production trend routes were censused in southcentral and southeast Idaho (table F-16, p. 144). Routes were run twice with all classes of broods counted on the early July run and only class 1 broods included for the late July run.

Combined results for the two southeast Idaho routes indicated a 15 percent increase in duck production from 1962. The one southcentral trend route yielded twice as many broods as any previous census year.

Conclusions

Numbers of geese counted by aerial census on Idaho goose breeding areas were up 37 percent from 1962 and far above the long-term average. The important Gray's Lake and Dingle Marsh units had major increases.

Goose production for the State was 24 percent above 1962 and 36 percent above the long-term average.

Duck production was judged to be excellent for southern Idaho, with favorable weather and water conditions prevailing.

CENTRAL FLYWAY

WATERFOWL KILL SURVEY

An estimated 439,200 ducks were bagged in the Central Flyway during the 1962-63 waterfowl season, a decrease of 48 percent from the previous season (table A-8). An additional 131,700 ducks were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 570,900 ducks.

Analysis of the total Flyway duck bag by species, as derived from data provided by the Duck Wing Survey, shows that the bag of mallards (203,200) comprised 46 percent of the total bag of all species. The bags of green-winged teal (43,200), pintail (46,900), gadwall (35,800), and American widgeon (29,500), together with mallards comprised 83 percent of the Flyway bag of all ducks.

All species of ducks registered sharp decreases in bag as compared to the previous season, except for gadwall which registered an increase of 29 percent and wood duck which registered an increase of 6 percent.

The total Flyway goose bag of an estimated 156,700 birds dropped 24 percent from the previous season. An additional 27,500 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approxi-

mately 184,000 geese (table A-9). All States registered sharp decreases in total goose bag as compared to the previous season, except Oklahoma and Montana (no change). These decreases primarily were due to a reduction in the number of active hunters, for the average seasonal goose bag per hunter increased in many of the States.

An estimated 10,100 coots were bagged in the Flyway, a decrease of 26 percent over the previous season. An additional 7,900 coots were knocked down but not retrieved, yielding a total kill (bag plus cripples) of about 18,000 coots.

All States registered substantial decreases in the total duck bag with the exception of North Dakota (+11%) (table A-10). The increase in the duck bag of this State was due to a slight increase in the number of active hunters and a moderate increase in the average seasonal duck bag.

A total of approximately 161,000 waterfowl hunters were active during an estimated 997,000 hunter-days, registering decreases in these estimates of 30 and 23 percent from the previous season.

WING COLLECTION SURVEY

Flyway-wide age ratios of the more important species of ducks in the kill during the 1961 and 1962 hunting seasons are listed in table B-2. Eight of the 12 species for which comparisons between years could be made showed a decrease in the ratio of immature to adult birds in the kill. Mallard age ratios in the Central Flyway (table B-3) were again the lowest in the Nation, although most States

in the Flyway did show an increase in the ratio of young to adult birds in the kill in 1962. Species composition in the Flyway kill is shown in table B-5. The percentage of the total kill consisting of mallards decreased from 54 to 49 percent in 1962, lesser scaup decreased from 6.6 to 2.5 percent, while ringnecks increased from 1.7 to 2.3 percent of the total kill.

WINTER SURVEY

Data supplied by Raymond J. Buller,
Central Flyway Representative
Bureau of Sport Fisheries and Wildlife

Weather conditions during the survey were such that visibility was excellent and coverage completed in a minimum of time throughout all sections of the Flyway except eastern Oklahoma and western Wyoming. Strong winds and turbulent air in southwest Texas necessitated the use of ground counts instead of aerial coverage. Large water areas in all States except Nebraska, Kansas, and Texas were generally covered with ice, and wintering waterfowl were concentrated on the larger rivers, spring-fed lakes, and open drain ditches. Inclement weather and unavailability of aircraft, and State personnel caused a delay in completing the survey in eastern Oklahoma until January 23. High winds and 50° weather made it impossible to complete the survey in Wyoming on schedule. A record-breaking cold wave and blizzard conditions struck the Texas Panhandle 2 days after the survey was initiated; many water areas were frozen and the wintering population decreased approximately 50 percent during the period.

Drought conditions prevailed along the lower Texas coast; this area has not received

appreciable amounts of precipitation since Hurricane Carla in September 1961.

Drought conditions were also reported by the Bureau crew that covered the east coast and interior Mexico. Coastal marshes from Tampico to the tip of Yucatan were almost dry. Increased oil exploration and drilling operations are creating pollution problems along the coast. Many of the water areas in interior Mexico were dry or nearly dry. Several areas were not covered due to weather and operational difficulties.

Weather and habitat conditions in the northern portion of the Flyway during the fall and early winter months were ideal for migrating and wintering birds. Mild temperatures, open water, and abundant food supplies in harvested grain fields caused birds to linger in migration. Fall flights of both ducks and geese en route to winter concentration areas in the southern portion of the Flyway were delayed a month or more. Drought conditions existed on the upper Texas coast until late November, when 5 inches of rain fell. This rainfall and subsequent rains made habitat conditions ideal by late December; mottled duck nesting habitat vastly improved.

BREEDING GROUND SURVEY

SOUTHERN SASKATCHEWAN

Data supplied by Rossalius C. Hanson
and Donald E. Wieland,
Bureau of Sport Fisheries and Wildlife

Weather and Habitat Conditions

Upon completion of the survey it was found that actually the only stratum that showed an increase in pond numbers, when compared to last year, was A-East. It was up 56 percent. All other strata showed definite decreases, with a total overall decrease of 28.7 percent from last year. The total pond index in 1963 stood at 960,400 compared to 1,347,300 in 1962, and 588,900 in 1961. Comparing it

to the long-term average of 1,489,500 ponds are down 35.5 percent this year from the long-term average. Only during 1959 and 1961 were there fewer ponds. These 2 years, indexes were 783,400 and 588,900, respectively.

One of the major factors which will determine the production this year as in past years of low water is the lasting quality of the water present in May. This year water quality in the ponds is poor. It was found that many of the ponds had 6 inches or less of water, with evident duck usage. In many instances no permanent ponds were in evidence in the near vicinity. This might develop as a real trap for broods. If spring is cool enough, and an early summer with replenishing rains it may bring the broods to maturity in some of these areas. Past experience has

proved, however, that this is always a highly unlikely occurrence. Most of the ponds are down 1 to 3 feet below their normal levels.

A dry fall in 1962 and little or no snow during the winter of 1962-1963 resulted in practically no runoff in southern Saskatchewan, thus the poor pond condition. Since April 1 good rains over much of the area have been a real help to farmers in getting sufficient moisture for their crops. This has done little or nothing to add depth to the ponds. Together with a cool May it has slowed down evaporation and helped to maintain what water was present at the start of the nesting season.

A look at rainfall reports indicates many areas with 100 percent above normal rainfall during April.

As mentioned, it was a cool early May with overnight temperatures on May 2, 3, and 4 below freezing. From early May to May 20 many nights were in the 30° - 40° range. In fact, on May 20 Saskatoon and Prince Albert registered 26° and on May 21 both showed 28°.

Mid-April had mild weather with reports of early arrivals of waterfowl and nesting activities taking place. Early in the spring the phenology of the season appeared to be as much as 3 weeks ahead of normal; with the advent of the cool weather in May it slowed down to no more than a week ahead, or close to normal.

This cold, damp weather in early May had its effect on early nesters. It was not possible to judge its impact on partially completed nests, or nests abandoned, but there were reports of cracked waterfowl eggs in nests in the Kinistino area. Past experience would indicate there might be smaller broods from the early nesting species. No doubt, renesting attempts will take place where eggs or nests were entirely lost from the freeze and inclement weather.

Foliage was well developed in the western portions of Saskatchewan's prairies by mid-May. In the B-East stratum as late as May 22, leaves were just starting to come out. Larger lakes, just north of Prince Albert, were still holding ice on that date. Except for scaup and other more northern nesters, migrants were conspicuously absent.

Nesting habitat, where water was available, appeared satisfactory. Many dry ponds and fringes had been cultivated or plowed but vegetation appeared to be adequate in the watered areas. Due to spring rains, vegetation was already abundant in the shallower

ponds and around the edges of the deeper water areas. Practically no burning was evident this spring due to the damp weather. There was no cultivation of stubble except for spring planting. Both of these factors were favorable for the field nesters.

In general, much of the pond area was poorer than last year. Several well-watered areas were found near Kerrobert, Macklin, Lake Alma area, Lloydminster, west of Old Wives Lake, and north of Saskatoon. These were offset by the many areas with very poor water depth such as the Coteau in general, west of Last Mountain Lake, most of the western and southwest portions of the Province, and the big central area around Regina.

The rains continued from April through July this year. Everything was green and certainly July pond conditions improved over the past 2 years. With the thunderstorms and gully washes more ponds should have been present in July than in May, but, the ground absorbed this moisture. Even though this was the first time ponds were seen developing in midsummer from rains, it still was not a province-wide situation. The real heavy rains came only in scattered areas and much of the overall dry Saskatchewan prairies did not increase in numbers of ponds. This was evident by the May pond count this year of 960,400 compared to the July index of 689,100. To say it had no effect would also be wrong because the rains helped hold the May ponds.

The outlook for next year is encouraging and it also is providing new pond areas which would be of benefit to late nesters. To show the effect, the July pond index of 1963 (689,100) compared to 1962 (245,700) showed an increase of 180.5 percent. It was also 33.1 percent above the 1958-62 average (517,900). Compared to the better water years of the midfifties, it was still down; for example, 1,439,400 pond index (1952-1962 average) a decrease this year of 52 percent (table D-2, p. 105).

The rains were a mixed blessing. Early nesting species had losses from nest flooding and heavy rains as indicated by the smaller percentage of class III broods. However, heavier numbers of class I and II broods indicate good usage of the rejuvenated water areas and the good late-nesting index also indicates benefits from the rains. In all, the benefits far outweighed the losses.

Saskatchewan rainfall from April 1 - July 18, 1963, shows 26 reporting stations with an above normal rainfall of 2.80 inches.

One station reported as much as 7 inches above normal. Only two, Kamsack and Hudson Bay, reported below normal rainfall. This same dry section was in B-East stratum; it was the only area showing a decrease in ponds from 1962.

Habitat conditions were good. Many of the May ponds carried through to July. Although most were choked with vegetation, water was still present in many. A few went dry and later were refilled by rains. These, of course, did not benefit the broods that were present but may have provided a little habitat for late nesters. All in all, for the numbers of ducks present, no lack of habitat was evident. Temperatures over the period were normal and except for the thunderstorms, no unusual weather was noted. In a number of the more severe thunderstorm areas, hail was reported which resulted in damage to wildlife and ducks. It is felt this loss was not widespread and would not be an important factor this year. It is a rare year that there are not some losses from hail in July.

Breeding Population Indexes

This year an increase was noted in the overall population of waterfowl using southern Saskatchewan. The total duck population index stood at 1,539,200 this year in comparison to 1,402,500 in 1962; and 3,697,700 the long-term average. This was an increase of 9.8 percent over 1962 and a decrease of 58.4 percent from the long-term average. The 1963 figure is still below all the previous years except 1962.

The most promising outlook was the 28 percent increase in dabbling ducks over last year. This was still 56.7 percent below the average. Mallards and pintails showed slight increases of 14.9 percent and 19.4 percent, respectively. Substantial increases were noted over 1962 in the case of gadwall, shoveler, baldpate, and teal. Except for gadwall, all these species were still below average in numbers. Gadwall showed a 40.5 percent increase over the average.

Divers were up and down as individual species went, but as a whole, were down 53.5 percent from 1962 and 70 percent from the average. Redhead and canvasback were down considerably from the average and from last year. Other diving ducks varied up and down by species. Coots were at an all-time low and indicated 87 percent below the average, and 53.5 percent below last year.

The low coot numbers registered in southern Saskatchewan may not be a true reflection of their status.

One species that has continued to increase over the dry years in the prairies and parklands of southern Saskatchewan has been the Canada goose. This is certainly encouraging and a credit to the agencies who have been active in the progressive management of this species in Saskatchewan. In 1958 not a single Canada goose was counted on the transects. They were present but in such small numbers that none were seen. From those earlier years they have increased steadily and recording of them have been made on transects since 1959. In 1963 the Canada goose index stood at 3,600, an increase of 38.5 percent over 1962; and 176.9 percent over the average. It is apparent that the Canada goose is coming along in fine shape.

The lone drake index is a forecast factor used to indicate the progress of the earlier nesters. The mallards, pintails, and canvasback lone drakes are tallied and compared to other years. The number of lone drakes present compared to pairs of the same species shows how well and how far along the nesting of these species has progressed. An early nesting season with the right kind of weather has generally been a forerunner of good nesting success. This is used as a barometer early in the season for forecasting success of the early nesters. This is used, particularly when no data in the form of broods present at this early date, to indicate what can be expected later in the summer. This year the lone drake index was 82.6 percent. This is the highest index since 1960.

Consult tables 14, 15, and 16 in Section E of the Appendix, pages 118 and 119 for a summary of southern Saskatchewan data.

Production Indexes

The duck brood index for July 1963 was nothing sensational. It was better than 1962 but still slightly under 1961 and all years previous to it. The index stood at 45,800 compared to 32,800 for 1962, an increase of 39.6 percent (table F-17, p. 145). In contrast to this, 1963 was still 81.6 percent under the long-term average (1952-1962) of 248,600. Most of this is attributed to poor early nesting efforts. Actually, class I broods were appearing all during the survey. Some of these were late nesters and others re-nesting attempts.

Ground crews reported a fairly successful early nesting success in stratum C. With this in mind, it is possible we could have missed some class III flying broods. These would have been few in number and would not have changed the overall Provincial picture. Along this same line heavy vegetation obscured some broods from the aerial observers. However, checking air data against ground data from the ground crews, on the air-ground visibility transects, it did not reveal any great discrepancies. The above two factors together would probably weigh the broods a little heavier than the data show.

Brood size was up this year. In 1963 the average class II and III brood size was 5.4 (table F-18, p. 146) compared to 4.9 in 1962 and 5.1 (1952 - 1962) average. This is contrary to what was expected in a fairly unsuccessful early nesting attempt. It may be that larger numbers of ducklings in class II broods offset the smaller numbers in class III. Ground crews reported a great many large numbered class I and II broods this year and this may well be the answer.

Coot broods were up over last year but still well below the long-term average. Coots must be considered on their overall widespread range and their adaptability to water conditions. Therefore, the indications in this area may mean very little when considering their overall status.

The index for 1963 was good. It stood at 67,600 compared to 19,800 for 1962. This was really a wonderful outlook for late-nesting species over 1962. It was also greater than the 1961 index, but did not come up to any years previous to 1961. It was still 33.3 percent under the 5-year average of 1958-1962. All species showed greater potential than in 1962. Compared to the 5-year average the species showing increases or greater late nesting potential were gadwall, green-winged teal, redheads, and ring-necked ducks. From ground reports blue-winged teal should also be in better late-nesting condition than the air data indicated.

Reports from ground crews, running air-ground visibility checks, indicated greater numbers of singles and drakes in the heavy vegetation than the air crews were seeing. These sightings were far greater in number than the discrepancies in the brood air-ground check. This leads to the belief that the heavy cover this year did reduce the air crews' ability to pick up the adult birds. Therefore, the aerial late nesting-index data are

smaller in proportion to what it would be in a normal year. As a result, the late nesting potential will be larger than what the aerial figures indicate.

Conclusions

Overall conditions appeared to warrant a ray of hope and optimism. The pond index is better than 1959 and 1961 but still down from 1962. The poor quality of the water depth this year can be an important factor. It has stopped numbers of ducks and they are nesting (lone drake percent indicator). All the sign posts point toward a wet spring and an early summer but if it does not materialize, look for a considerable reduction in the hatch. The duck population index is up, but only slightly, 9.8 percent over last year and still 58.4 percent below the long-term average. This low number must be carefully weighed because in better years in southern Saskatchewan there was upwards to a 5 and 6 million duck index. The million and a half index this year is 5 million below the peak of 6 1/2 million in 1956. Therefore, we now have only 23 percent of the peak population engaged in production. The May "Waterfowl Crop Outlook Chart" indicates another year with an unsatisfactory outlook for the fall flight from this area. The outlook is slightly better than 1961 and 1962 but even so, not for much of a crop.

This year the outlook is one of cautious optimism. Conditions since May have been good. A favorable increase in population is expected. Production broods seen are up and the late nesting index is good. Water conditions were improving and the July pond index was considerably higher than last year and the past 5-year averages. The early nesters have not improved as much as the late nesters. Redheads and canvasbacks appear to be improving. Gadwall should be more numerous.

Considering all the factors, it would appear that the fall flight from southern Saskatchewan will be better than 1961 and 1962 but not as good as 1960. The crop forecast index stands at 81. According to past indexes this is still an unsatisfactory outlook. However, considering the poor visibility this year in registering the late nesting index, the outlook may turn out to be satisfactory.

One thing to remember, even though the production outlook is promising, the May population index is still low. All indications

point toward a comeback in this area but still a long way from duck peaks of the midfifties.

MONTANA

Data supplied by Dale Witt
and Wynn G. Freeman, Montana
Department of Fish and Game

Weather and Habitat Conditions

Water conditions during the May survey in the glaciated sub-divisions showed improvement in two areas and a decline in the other two (table D-3, p. 105). The water conditions were greatly improved in the eastern part of the State and deteriorated in the western part, east of the Continental Divide.

In the unglaciated prairies water conditions were greatly improved. In the McCone County Trend Area the water index was the highest recorded since records were kept in 1952. This was generally true in the whole southeastern part of the State.

The water conditions in the Flathead Valley or Pacific Flyway portion of the State were generally good.

Breeding Population Indexes

The 1963 May survey of the glaciated sub-divisions indicated an increase in total ducks over last year. Three of the subdivisions showed an increase over last year, with two divisions having populations above the 14-year average (table E-17, p. 120).

In the unglaciated prairie the conditions look even better. On the McCone County Trend Area the waterfowl index was the highest ever recorded. This year there were 3.7 ducks a square mile as compared to 1.5 ducks a square mile last year. The 11-year average for this area is 1.4 ducks a square mile.

This year a survey was made in the central portion of the unglaciated prairie, covering the stratum J. Donald Smith flew in 1958.

Transects were flown sampling an area of 12,618 square miles. The waterfowl index was determined to be 8.3 ducks a square mile or 104,720 ducks. The 1958 index was 1.4 ducks a square mile in the area. From the above data it is evident that the unglaciated prairies have a significant increase in waterfowl. Because of the size of this area

(approximately 60,000 square miles) there could be one-half million ducks present. This is one of the highest waterfowl indexes the State has ever had.

The 1958 survey showed 92 percent mallards whereas the 1963 survey indicated slightly over 50 percent mallards.

Canada goose breeding population trends in the Hi-Line, Helena, and East slope showed increases (table E-18, p. 120).

The waterfowl breeding population survey in the Flathead Valley was not conducted this year.

Production Indexes

Production and brooding conditions in eastern Montana in both the glaciated and unglaciated prairies are very good with one exception. The Great Falls Piedmont area remained in poor condition, especially that portion just south of Alberta. The remainder of the State still received above average rainfall.

Duck production surveys were not conducted in the State this year. Observations during goose production surveys showed an exceptional early hatch of mallards and pintails in the areas checked. Considering the increase in populations on the unglaciated prairie, fall flights coming from the Central Flyway portion of Montana is as good as, or better than, it has ever been since the start of the surveys.

The Canada goose production trend showed a surprising increase over last year. In the Hi-Line Unit, the production is the highest since the survey was started in 1954. At present the only explanation for this increase in production is the exceptional water conditions present in this area. In the East Slope and Helena Units the production trend indicated increases (table F-19, p. 147).

A serious drop in production was noted on the Marias River downstream from the dam where water releases were increased at the peak of nesting and considerable flooding occurred.

The decrease in production both 1962 and 1963 could have been from poor counts in the upper end of Flathead Lake (Flathead Valley Unit). The river below the lake was down in both years. Different observers made the count in 1963 which may also have had an influence.

Conclusions

Water conditions were improved in two areas of the glaciated subdivisions and declined in the other two. Great improvement in water condition was noted in the unglaciated portion of the State. Late water conditions in all areas improved.

Breeding populations of ducks was up 14 percent from last year and in two of the physiographic areas it was above the 14-year average.

The unglaciated prairie showed the greatest increase in duck numbers. One trend area more than doubled and the waterfowl index was the highest recorded. This should be one of the largest fall flights of ducks from the Central Flyway portion of Montana in recent years.

Canada goose population and production trends were up in all flock units in the Central Flyway. The production in the Hi-Line Unit was the largest ever recorded. The Flathead flock showed another decrease from last year.

No duck surveys were conducted in the Pacific Flyway portion of Montana.

Tri-State Area (North and South Dakota and Minnesota)

Data supplied by Glenn Orton, David Fisher, Robert Wheeler, Raymond Buller and Gerald Pospichal, Bureau of Sport Fisheries and Wildlife

Weather and Habitat Conditions

The tri-State area entered the winter period with pothole levels in the best condition noted in the last several years. Snow cover was light over most of the Dakotas and western Minnesota during the winter of 1963-63. Unseasonably warm weather during late February and early March melted accumulated snows without a great amount of runoff. As spring advanced, moderate to heavy rainfall occurred over most of the central and eastern strata and pothole levels recovered to where they ranged from good to excellent when the ducks arrived.

May temperatures averaged below normal over the entire survey area. A low of 14° was reached on May 22 in central North Dakota breaking all-time records. May frosts caused crop damage over parts of North Dakota but

not to the extent that extensive replanting was necessary. High winds and intermittent rainstorms delayed field operations for 2 days. Otherwise, no operational problems were encountered.

Planting of cereal grains, flax and corn, was ahead of schedule. Growth of winter wheat was well advanced and the general crop outlook appeared favorable.

As indicated in the table D-4, p. 106, water conditions were considerably improved, an increase of 18 percent over last year and 51 percent over the average of the previous 5 years. In some areas, particularly the northwestern part of North Dakota, levels were low and potholes will be dry by mid-June unless supplemented by spring rains. Over-water nesting habitat showed good recovery. In some instances, this cover, and the new emergent vegetation which was making rapid growth, hindered aerial observations. Spring burning was in evidence this year in harvested small grain fields and soil bank lands, more so in North Dakota than South Dakota. Stock ponds in South Dakota were holding maximum water levels again this year.

Normal to slightly below normal temperatures prevailed over the survey area from late May until late June. Scattered heavy rainfall occurred throughout the tri-State area and by mid-June, water levels were more favorable than in late April and early May, except for scattered districts throughout central South Dakota and northeast North Dakota. These conditions prevailed until late June when temperatures rose to the mid-nineties and continuing hot, dry winds caused rapid water loss, especially in the smaller potholes. Local storms with high winds, rain, and hail caused severe crop damage in eastern South Dakota, western Minnesota, and southeastern North Dakota. Generally, bumper crops were predicted for most parts of the tri-State area, including both small grains and row crops. The small grain harvest begun in south central South Dakota by July 7, moved rapidly northward by the end of the survey period.

Breeding Population Indexes

Table E-19, (p. 121), shows trends in population indexes by species for the years 1959-63. Table E-20, (p. 121) lists comparative breeding population indexes by species and stratum with comparisons to 1962 and to the previous 5-year average. Comparative lone

drake indexes for the years 1959 through 1963 are listed on table E-21(p. 122). The 77.7 percent of lone drakes in the survey area indicated the nesting effort was well advanced.

As indicated in table E-20, total dabblers showed an increase of 32 percent over 1962 and 57 percent over the 6-year average. Mallards, gadwall, and blue-winged teal increased 79 percent, 120 percent, and 55 percent from 1962 and showed respective increases of 60 percent, 191 percent, and 70 percent from the 6-year average. Pintail and shovelers dropped 32 percent and 14 percent from 1962. Pintail populations were about equal to the long-term average while shovelers were 59 percent above. American widgeon and green-winged teal were relatively scarce and showed drops from 1962. With the improved habitat conditions, total divers showed a 26 percent increase over 1962 and a substantial increase of 70 percent over the 6-year average. Redheads showed increases 39 percent and 105 percent. Canvasbacks increased 350 percent over 1962 and 50 percent over the long-term average. Relative numbers of both of these species were small.

In summary, the total duck index was 32 percent above 1962 and 58 percent above the 6-year average. Coot were 43 percent below 1962 and 2 percent above the average.

Production Indexes

From all indications early nesting efforts were highly successful. The tri-State July waterfowl brood index, at 108,000 was the highest recorded since this survey was organized. Total duck broods increased 45 percent over 1962 and 56 percent over the 5-year average. Average brood size in 1962 was 5.2 as compared to 3.4 in 1962. Coot broods increased 3 percent from 1962 and 21 percent over the average. Ground observations indicated that this coot index could be much higher than aerial observations indicated.

The 1963 July water index showed a drop of 28 percent from May. July levels, however, were 7 percent above 1962 and 3 percent above the 2-year average. Vegetative cover was rank and hindered aerial observations in most of the tri-State area. Soil moisture has greatly improved and brightens the outlook for next year if normal fall weather conditions prevail.

By its decline, the late-nesting index graphically supports the high brood index.

As compared to 1962, the late-nesting index for all ducks showed a 40 percent decline. Dabblers which make up approximately 75 percent of the total population showed a decline of 50 percent as compared to 1962. Of the dabblers, late nesting indexes for the particular species are listed as follows as compared to 1962 and the 5-year average: mallard, -35, -0.3; gadwall, -28, +48; blue-winged teal, -64, -9; pintail, -70, -40. The late nesting index for divers showed a +17 percent increase over 1962 and a 62 percent increase over the long-term average. Species represented were mainly redhead and ruddy ducks. Redheads showed a decline of 39 percent from 1962 and an increase of 55 percent from the long-term average. Late nesting ruddys were 95 percent above 1962 and 97 percent over the average. Very few canvasbacks were observed either on or off transect. Most of the pintail and mallard broods observed were in late class II and class III ages. This, plus the absence of lone drakes and mallards, further substantiates the success of the early nesting efforts. (Tables F-20 and F-21, pp. 148 and 149).

Conclusions

The spring of 1963 showed a substantial improvement in waterfowl habitat conditions in the Dakotas and Minnesota over 1962. Breeding populations of the more important species (mallards, gadwall, blue-winged teal, pintail, canvasback and redheads) were above long-term averages and should contribute to production greater than last year. During May 1962 very heavy rains covered the entire tri-State area and a substantial part of the early nesting effort, particularly mallards, were flooded out. During May of 1963, intermittent heavy rains dropped up to 5 inches of moisture in several sections of South Dakota.

Water conditions showed minor improvements over 1962 and the long-term average. Birds were already settled at the time the late spring rains arrived. There was no general flooding as occurred in 1962.

Despite late June and early July water losses, a sufficient number of brood areas remain to carry the broods through to flying age. Ground observations and success of banding crews in the tri-State area have helped to confirm the aerial observations.

of highly successful production from the early nesting efforts.

Late nesting indexes were below 1962 by 40 percent though 10 percent above the average. Dabblers were down 50 percent from 1962 and 0.4 below the average. Comparisons to 1962 and the 5-year average by species is as follows: mallard, -35, -0.3; gadwall, -28, +48; blue-winged teal, -64, -9; pintail, -70, -40; redhead, -39, +55; ruddy, +95, +97.

NORTH DAKOTA

Data supplied by Charles H. Schroeder
North Dakota Game and Fish Department

Weather and Habitat Conditions

Water conditions in North Dakota at the time of the mid-July survey were good as, or better than, in 1962. In that respect the 1963 water index is misleading, since the water index of 4.04 represented a 24 percent decrease from the 1962 water index of 5.33. This discrepancy resulted from the numerous type 1 water areas recorded in 1962 (survey followed heavy rains), while in 1963 the dense vegetation prevented the detection of some of the type 1 and 3 areas. The 1963 water index represented a 16 percent increase over the 1958-1962 average water index of 3.49.

The number of water areas observed along each transect and the resulting water index (water areas a square mile) are presented in table F-22 (p. 149).

Production Indexes

The 1963 mid-July brood index (broods a square mile) of 1.66 represented an increase of 152 percent over the 1962 brood index of 0.66, and an increase of 32 percent over the 1955-1962 average index of 1.26. The 1961 brood index was not included in the 1955-1962 average, since comparable brood data were not obtained in 1961.

The number of duck broods observed along each transect in 1963 and the resulting brood index are presented in table F-22 (p. 149).

The average number of ducklings a brood in 1963 was 7.7 as compared to 8.0 in 1962; 6.2 in 1961; 8.8 in 1960; 7.0 in 1959; 8.0 in 1958; 7.7 in 1957; 7.3 in 1956; and 7.7 in 1955.

The distribution of the duck broods by age classes I, II, and III in 1963 was only slightly different from that of 1962 and the 1955-1962 averages. In 1963 a larger percent of the total broods were in class II than was the case in 1962, or for the 1955-1962 averages.

The distribution of the duck broods by age in 1963 is presented in table F-23. (p. 150).

The species composition of the duck broods observed in 1963 is presented in table F-24 (p. 150), along with that for 1962 and for the 1955 through 1962 average.

Conclusions

Water conditions continued to improve slowly in North Dakota in 1963 from those experienced during 1959 and 1961. The improvements were accompanied by a very profuse growth of wetlands vegetation which severely limited observations on many of the water areas and even resulted in some of the type 1 and 3 areas being missed during the survey.

A fair number of canvasback and redhead broods were observed during the survey. At this time it would appear that these two species are experiencing their best production year since the mid-1950's.

The fall flight of ducks from North Dakota in 1963 is expected to be considerably above that of 1962 and it could be the largest flight since 1956.

NEBRASKA

Data supplied by Nebraska
Game, Forestation and Parks
Commission

Weather and Habitat Conditions

Water conditions were generally good throughout the Sandhills portion of Nebraska during the breeding ground surveys. Some portions of the extreme eastern and western sections of the Sandhills were only in fair condition with regard to the availability of water. Survey flights were made during the period May 14 through May 20, 1963.

The increased supply of water during the spring migration period helped to hold many birds in the area.

Water levels were either maintained, or dropped only slightly, until about July 1.

Water losses have been rapid from that time on, particularly in those areas in the eastern and western Sandhills where water was only in moderate supply at the start of the breeding season.

Although there were not as many water areas recorded in the surveys as were present in 1962, they were generally of a more permanent nature with better quality habitat.

The basin area of south-central Nebraska was very short of water during the spring breeding pair survey. Only a few of the deeper basins held small amounts of water. Although there has been some easing of the situation it was felt that there was not enough potential in the area for 1963 production to warrant brood flight surveys.

Weather conditions during spring and early summer consisted of fairly cool temperatures with moderate rainfall. No above-normal amounts of rainfall occurred as in 1962.

A severe freeze on April 20 and 21 may have chilled some eggs. The usual hailstorms occurred from time to time during the late spring and summer. Because of the local nature of these storms, it is doubtful that they caused many adult or waterfowl brood fatalities.

Breeding Population Indexes

The 1963 aerial breeding ground transects were flown over the Sandhills breeding area during the period May 14 through May 20, 1963. The entire series of transects were surveyed.

The calculated breeding duck population for the Sandhills was 114,910 birds of all species. This figure represents a 66.8 percent increase over the calculated 1962 population figure.

The calculated population index for stratum A was 94,061 ducks, and 12,963 birds for stratum B. The index was up 57.5 percent for stratum A, and 43.6 percent for stratum B.

A total of 1,152 transect miles were flown in the Sandhills for a sample coverage of 288 square miles. A total of 1,943 ducks of all species were counted. With the exception of scaup, all species were substantially above the 1962 count.

Production Indexes

Aerial brood transects were flown over the Sandhills breeding area during the period

July 9-17, 1963. The same transects were flown for brood surveys as were flown for the breeding grounds survey.

A total of 108 broods was observed on the July aerial survey. Good counts were obtained on 90 broods with a total of 529 ducklings. The total number of broods sighted was up 771.4 percent from 1962, and the number of ducklings was up 839.7 percent. The number of ducklings a brood from the aerial counts was 5.88, an increase of 0.63 from 1962.

The hatch appears to be only slightly irregular, indicating some renesting activity. Newly hatched broods are still appearing (July 22). Only 5.1 percent of the ducklings were in class I. Class II and III ducklings were 49.3 and 45.6 percent.

Summaries of the survey are found in tables F-25, F-26, and F-27 (pp. 150 and 151).

Conclusions

The 1963 waterfowl production in the Nebraska Sandhills will be considerably greater than that of 1962. Production should be at least three times that of 1962. Although water disappeared rapidly in many areas, most broods were sufficiently advanced so as not to be too much affected.

WYOMING

Data supplied by George Wrakestraw
Wyoming Game and Fish Commission

Weather and Habitat Conditions

Range and water conditions at the start of 1963 were at a very high level for most of the State. As spring advanced, parts of the State deteriorated to a level equal to that experienced in 1961. Fortunately, the area affected was limited to the southeastern corner of Wyoming, which makes up but a small part of the total production area. All major water impoundments were filled to extremely high levels, insuring adequate water for downstream uses. Runoff from the high mountain areas was good in most areas.

May and June of this year were months of wet, cold weather which assured enough water areas to see broods to the wing. However, most of the precipitation occurred after the migration had passed through the State.

Breeding Population Indexes

Table E-22 (p. 122) presents a summary of the duck breeding ground survey for 1963. The estimated breeding pair population for 1963 shows an increase of 66 percent from 1962 and an increase of 79 percent from the 1955-1962 average.

The total number of ducks counted is computed by combining the number of breeding pairs with birds that are found in groups. It will be seen that the total number of birds counted in 1963 is 297,675, or 49 percent above the estimate for 1962. Furthermore, this figure represents an increase of 72 percent from the previous 7-year average.

Table E-23 (p. 123) indicates the long-term breeding ground trend for geese in Wyoming. In 1963 an increase of 47 percent was recorded over 1962 and an increase of 76 percent was registered over the long-term average.

Production Indexes

Production surveys conducted on the Snake River, Bear River, and Ocean Lake indicate a loss of goslings on the Snake River because of nest flooding, and a significant increase in production on the Bear River, and no change at Ocean Lake. No production surveys were made on ducks.

Conclusions

Water and range conditions were at high levels over most of Wyoming, with the exception of isolated areas.

Early flights of ducks through the State were reported to be as large as any witnessed in the last 10 years.

Ducks were recorded in greater numbers on existing areas and it was concluded that the fall flight of ducks from Wyoming will be one of the best ever.

Canada goose populations in Wyoming are at the highest level ever recorded since surveys have been made. It appears that the fall flight of geese from this State will be the greatest ever experienced.

COLORADO

Data supplied by William H. Rutherford
Colorado Game and Fish Department

Weather and Habitat Conditions

Weather conditions in Colorado during the spring and early summer were considered to be excellent for waterfowl nesting and production. Water conditions were considerably poorer than last year, since the State experienced one of the driest winter and spring seasons on record. Fortunately, reservoir storage was good, and spring runoff water was sufficient to provide adequate water areas for nesting habitat. In eastern Colorado and the San Luis Valley, most sloughs and ditches were full, and most reservoirs contained water. In North Park and on the western slope, sufficient early water was available for meadow flooding. At the date of this writing, reservoir storage was dwindling, the high-country snow pack was rapidly diminishing, and precipitation was far below normal. It is expected that midsummer water supplies will be generally short over the State, with some areas becoming critical. In summary, overall weather and water conditions in Colorado seem to point toward a good year for waterfowl hatching, but a poorer year for later brood rearing.

Breeding Population Indexes

Examination of the duck breeding-pair estimates by area (table E-24, p. 123) revealed that the 1963 total counts were up 7 percent from 1962, and 83 percent above the (1954-1962) 9-year average. In spite of a dry season, it was apparent that sufficient nesting habitat was available to continue the year-to-year upward trend in breeding-pair numbers which Colorado is experiencing.

Comparison of individual breeding ground estimates between 1962 and 1963 showed that the duck population in the San Luis Valley was 20 percent below last year and 74 percent above the 9-year average. In the Yampa Valley ducks were 9 percent below last year

and 18 percent above the 9-year average. In North Park, the Cache la Poudre Valley, and the South Platte Valley, breeding-pair populations were increased both over last year and over the 9-year average, being 67 and 40; 23 and 37; 129 and 282 percent, respectively. In Brown's Park, the continuing deterioration of waterfowl breeding habitat, made more acute this year by low-river volume flow as a result of the filling of Flaming Gorge Reservoir, resulted in a decrease in duck breeding-pair numbers of 27 percent from last year and 48 percent from the 9-year average.

In an attempt to refine the sampling technique in the San Luis Valley, the aerial counts were recorded by the number of ducks observed a 5-mile transect segment. It was hoped that separate estimates of breeding-pair populations according to habitat quality would provide a more realistic picture of the duck populations in the Valley, and that sampling accuracy would be improved. However, this did not prove to be the case. At the present level of sampling, a population change of 26 percent is the smallest which can be detected, based on 1963 sampling conditions.

Species composition percentages of the breeding duck population differed from those of past years. Mallards and blue-winged teals were up considerably; shovelers and mergansers were up slightly; pintails, gadwalls, redheads, and cinnamon teals were down slightly; and other species held at about the same level (table E-25, p. 123).

In 1963, the western slope Canada goose breeding area continued to exhibit the steadily increasing breeding flock which has been noted during the past several years. The largest number of adult geese observed since the beginning of the study in 1956 occurred this year, and the number of goslings observed was down only slightly. However, this year's survey was not comparable to that

of last year, because of phenological differences. The peak of hatching this year occurred about 2 weeks earlier, and it was known that several broods and hatched nests were present which were not observed. The volume of spring runoff water was less this year, and the peak of high water occurred earlier than normal. This means that few, if any, nests were flooded, and nesting success should have been as good or better than last year.

Production Indexes

Tables F-28, F-29, and F-30 (pp. 151 and 152) list the numbers, age composition, locations, and past year's comparisons of this breeding goose flock. Brown's Park continued to show a decrease in goose numbers, and it appeared that it can no longer be considered significant goose breeding area. The goose population on the Yampa River increased 26 percent over 1962, and 164 percent over the 1958-1962 average. The Little Snake River was surveyed for the second year, and showed a total population increase of 114 percent.

This goose flock is continuing to show a steady and healthy increase, indicating that the restrictive harvest-type management employed by the Bureau of Sport Fisheries and Wildlife, and individual States up and down the Flyway, are now and will be in the future a necessary part of flock management.

Conclusion

It is anticipated that fall duck flights from Colorado will be normal to or above average, in spite of expected short water supplies through the summer. Water areas should remain adequate to see hatching and early brood rearing completed successfully.

MISSISSIPPI FLYWAY WATERFOWL KILL SURVEY

An estimated 1,024,900 ducks were bagged in the Mississippi Flyway during the 1962-63 waterfowl season, a decrease of 41 percent from the previous season (table A-11). An additional 318,100 ducks were knocked down

but not retrieved, for a total kill (bag plus cripples) of approximately 1,343,000 ducks.

Analysis of the total Flyway duck bag, by species, as derived from data provided by the Duck Wing Survey, shows that the bags of eight

species-mallard (406,800), wood duck (150,500), ring-necked duck (80,900, green-winged teal (63,100), American widgeon (49,300), pintail (47,800), lesser scaup (43,600), and black duck (43,200)-totaled 885,200 ducks or 86 percent of the Flyway bag of all species.

Among dabbling ducks only wood duck and blue-winged teal registered bag increases (39% and 5%) over the previous hunting season. Of the diving ducks only ruddy duck (29%), greater scaup (21%), and ring-necked duck (2%) registered bag increases.

The total Flyway goose bag of an estimated 130,200 birds dropped 24 percent from the previous season. An additional 27,400 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 157,600 geese. All States registered decreases in the goose kill except Mississippi

(+300%), Alabama (+278%), Ohio (+14%), and Michigan (+10%) as shown in table A-12.

An estimated 80,600 coots were bagged in the Flyway, an increase of 11 percent over the previous season. An additional 24,500 coots were knocked down but not retrieved, yielding a total kill (bag plus cripples) of about 105,100 coots.

All States registered sharp decreases in the total duck bag with the exception of Mississippi (+76%) and Alabama (+57%), table A-13. The estimated increases in the total duck bags of these two States were both due to an increase in active hunters and an increase in the average seasonal bag per hunter.

A total of approximately 357,640 waterfowl hunters, 23 percent, were afield during an estimated 2,084,800 hunter-days, registering a decrease in the estimate of 29 percent from the previous year.

WING COLLECTION SURVEY

Flyway-wide age ratios of the more important species of ducks in the kill in the Mississippi Flyway during the 1960, 1961, and 1962 hunting seasons are shown in table B-3, (p. 76). Eight of the 13 species considered here showed fewer immatures per adult in the 1962 kill than in the 1961 kill. The ratio of immature to adult mallards (table B-3) was slightly higher in 1962 than in 1961 in most of the States. The largest increases were in the northern half of the Flyway. The weighted flyway-wide ratio increased from 1.08 immatures per adult in 1961 to 1.40 immatures per adult in 1962. Black duck wing collections in the Mississippi

Flyway in 1962 indicated lower ratios of immature to adult birds from both Wisconsin and Michigan (table B-4). Black duck age ratios from other States in the Flyway were generally similar to those obtained in 1961.

Species composition of the kill in the Mississippi Flyway is shown in table B-5. Mallards decreased from 48.9 to 40.0 percent of the total kill. The proportion of the kill consisting of wood ducks showed a large increase from 6.1 to 15.3 percent of the total kill. Lesser scaup declined from 8.9 to 4.1 percent, while the ringneck increased from 4.4 to 7.7 percent of the total kill.

WINTER SURVEY

Data supplied by Arthur S. Hawkins
Mississippi Flyway Representative, Bureau
of Sport Fisheries and Wildlife

This year the annual midwinter waterfowl survey in the 14 Mississippi Flyway States started on January 7 and ended January 15. As usual, a few individuals having wide experience in assessing bird populations tallied the waterfowl present in all the key areas while a larger corps of less experienced observers covered the widely scattered minor

wintering areas. The total number participating (740) and total miles traveled (61,000) during the survey were identical this year and 1962. The Department of Defense again assisted the Bureau of Sport Fisheries and Wildlife and the State conservation departments in making complete coverage possible.

Weather usually interferes with the midwinter survey operation and this year was no exception. However, most of the survey was conducted under remarkably favorable conditions and operational difficulties were at a minimum. While the 1962 survey required a

span of 13 days for completion, the 1963 survey took only 9 days from beginning to end. Last year, severe weather conditions interrupted the operation and introduced the possibility of shifts in population.

In Region 3, snow cover was generally light or absent over much of the area at the time of the survey and the waterfowl had little difficulty finding food. This was in contrast to the situation last year when severe winter conditions had pushed most of the birds farther south. The winter habitat was restricted by ice and the absence of flooding, which sometimes makes the birds difficult to

locate. This, with good weather during the survey, probably resulted in complete counts.

In Region 4 unusually dry conditions over much of the southern part of the Flyway resulted in restricted wintering places, which simplified field operations. In Arkansas few of the reservoirs had been flooded artificially because of the low mallard limits. This restricted the number of places where ducks might disperse and made the counting easier. Timely rains refilled the droughty coastal marshes of Louisiana in time to attract many wintering waterfowl.

BREEDING GROUND SURVEY

NORTHERN SASKATCHEWAN NORTHERN MANITOBA WESTERN ONTARIO

Data supplied by Arthur R. Brazda
and Gust J. Nun
Bureau of Sport Fisheries and Wildlife

Weather and Habitat Conditions

Ice was slow in going out in the bush area of Prince Albert. Parts of two Ontario transects had to be omitted because of inclement weather. Otherwise, coverage was comparable to that of 1962. Upon arrival in The Pas on May 25 all the larger lakes and marshes were free of ice. Green vegetation was practically nil at this time; only small patches of aspen were beginning to show any development. The numerous pairs of late nesters observed in the Saskatchewan River Delta area, as well as the absence of flocked birds and the prevalence of drakes in the early nesters, suggested that mating was in full swing, but probably had not been very long.

On May 27, Manitoba #1 was completed to Kenora. Lake Winnipeg was free of ice except for two small areas. Leaf development on the aspen was more in evidence in the southern part, but was noticeable until we passed through an east-west line approximately 50 miles north of Kenora.

Showers were encountered almost continually. Due to weather, seven segments of transect #3, and thirteen segments of transect #4 were omitted.

Average temperatures rose appreciably after June 2 and vegetation development was rapid throughout most of the survey area.

The only ice observed in Ontario was on Wunnimin Lake on May 30; several large bays were still closed, but the ice appeared to be disintegrating rapidly.

All of Ontario appeared to be in excellent shape for waterfowl, some minor flooding was evident. The tamarac-meadow marshes west of James Bay were in a prime state and many pairs of Canada geese were observed in this area.

In Saskatchewan, the water supply ranged from fair along the northern transects to poor in the south. Except for the Meadow Lake region and the Beaver River bottom lands water conditions were below 1962. Meadow Lake and Beaver River were in excellent condition and held a large number of birds. The Gordon Lake locality also appeared in fair shape with many birds in evidence.

Ice was completely gone from all lakes by June 13, and only a few isolated patches of snow remained along the shore of South Indian Lake.

In comparison to the 1963 May-June survey, habitat conditions were the same or improved throughout the survey area in July. The area of greatest improvement was the southern bush-pothole region of Saskatchewan. In all probability, this improvement allowed broods to survive on potholes where marginal water conditions existed previously. However, the moisture came too late for much of the new habitat to be used in the 1963 production season.

The Meadow Lake-Green Lake area continued to look good as it did in May.

Conditions around The Pas, Manitoba, followed the same trend and were much better in July than during the May survey; this is

substantiated by the almost complete lack of forest fires in either Manitoba or Saskatchewan. The other parts of Manitoba continued to be good. Excessive water may have caused some nest loss east of Lynn Lake in northern Manitoba. Last year The Pas region burned continuously during the entire summer. Ontario water levels, which were very high in May, were reduced to what appeared to be a normal summer state. However, this was not true in the southern parts of the Province where a lack of moisture had created a semi-drought condition.

Breeding Population Indexes

Survey results are shown in tables E-26 and E-27 (pp. 124 and 125). An overall population decrease of 15 percent from 1962 is indicated. This is due mainly to the substantial decrease of 43 percent in Ontario. The only other region showing a decrease was Manitoba. The remaining three regions, the Saskatchewan River Delta and Saskatchewan, both North and south of 55° 30' N., suggested slight increases or a static condition.

The surprising revelation is that all species of ducks were down, including the usually numerous scaup, ringnecks, and mergansers. A possible solution is that due to a fairly early breakup, the birds were further north.

The coot population made good gains in the Saskatchewan River Delta and Saskatchewan (south of 55° 30' N.) areas which are the only places they were observed.

Canada geese were down in all survey areas except Ontario.

Production Indexes

Survey data are shown in tables F-31 and F-32 (pp. 152 and 153). The total duckling index continued to gravitate upward. The 481,489 represents a 22.3 percent change from 1962, and is the highest since 1955. Comparable data previous to 1955 are not available at this time. The late nesting index, gathered within an observing radius of one-sixteenth of a mile, indicated a moderate change of 10.5 percent, though it continues to remain high when compared with years prior to 1962

when a radius of one-eighth of a mile was used.

Ontario data indicates a 25.6 percent decrease in the number of ducklings and a 23.8 percent increase in LNI. Conversely, Manitoba D-1 and D-2 (Saskatchewan River Delta) and Saskatchewan, south of 55° 30' latitude, show an increase in the number of ducklings and a substantial decrease in the LNI. All areas except Ontario had an increase in the number of ducklings.

Data in table F-32 (p. 153), which is a comparison of brood classification information, indicate that results of the first nesting attempt were excellent. A total of 88 percent of the broods observed were in class II and III; this is the highest recorded for this survey area.

Data from the survey indicate that the large number of ducklings is because of the 6.35 average size of class II and III broods rather than to a large number of broods. Actually there was a reduction of 890 class II and III broods from 1962. The average size of class II and III Canada geese broods dropped considerably in 1963, though the number of broods showed only a moderate decrease.

While the tables in this report deal exclusively with ducks and geese, it is appropriate that coot be mentioned also. This species was observed only on Saskatchewan #1 and Manitoba D-1 and D-2. The 1963 breeding population survey in May-June indicated a marked increase from 6,147 to 18,109 birds. However, the number of broods observed was low. These data, along with the small size of the young observed, indicate that the broods were just beginning to hatch at the time of the survey.

Conclusion

The data obtained on the survey indicate that while marginal habitat conditions continue to exist in the prairie regions, production in the north-central area remains the same. The number of estimated broods in 1963 (51,040) was almost identical to 1962 (51,930). However, the larger average class II and III brood size in 1963 (6.35) as compared to 1962 (4.84) suggests a moderate increase in the fall flight from this region.

SOUTHERN MANITOBA

Data supplied by J. D. Smith,
Richard Droll,
and Morton M. Smith,
Bureau of Sport Fisheries and Wildlife

Weather and Habitat Conditions

Mild weather in late April and early May brought the mallards, pintails, and canvas-back into southern Manitoba earlier than last year. However, this mild weather gave way to a cold spell on May 3 when temperatures dropped to 19° at Brandon. Generally, cold and wet conditions prevailed thereafter and through the survey period with only a few days of sunshine occurring during the latter part of the period. Night temperatures

dropped to 20° on May 23, which may have caused some damage to the late nesting species. On May 19 a snow storm resulted in a 6-inch covering of snow over the Riding Mountains and Dauphin Plains.

The 1963 Manitoba water conditions were much improved over last year but remain 17 percent below the 10-year average. April precipitation in Manitoba amounted to .66 inches above the 73-year average and .9 inches more than in April 1962. By the end of the survey period on May 24 the March-April-May precipitation exceeded the 73-year average for that period by .06 inches and, since some rain had fallen during the last week of May in Manitoba, the 3-month precipitation total exceeded the long-term average. The following table summarizes May temperatures and percent precipitation:

Weather records at Brandon, Manitoba, May, 1963

| Date | Temperature | | Precipitation |
|-------|-------------|-----|---------------|
| | High | Low | |
| May 1 | 78 | 41 | + |
| 2 | 62 | 39 | .14 |
| 3 | 45 | 19 | - |
| 4 | 43 | 21 | - |
| 5 | 50 | 33 | .04 |
| 6 | 68 | 29 | .09 |
| 7 | 71 | 45 | + |
| 8 | 68 | 41 | - |
| 9 | 53 | 34 | + |
| 10 | 61 | 37 | - |
| 11 | 57 | 32 | .37 |
| 12 | 42 | 38 | .69 |
| 13 | 47 | 41 | .15 |
| 14 | 64 | 42 | - |
| 15 | 76 | 40 | - |
| 16 | 78 | 43 | + |
| 17 | 63 | 43 | + |
| 18 | 59 | 37 | - |
| 19 | 61 | 30 | .06 |
| 20 | 46 | 33 | + |
| 21 | 42 | 26 | - |
| 22 | 61 | 20 | - |
| 23 | 73 | 33 | - |
| 24 | - | 42 | - |

The good water conditions scaled off rapidly as the western provincial boundary was approached. In western Manitoba water areas were shallow and were not being sustained by rainfall.

Crop seeding was considerably delayed by cold, wet May weather. There was a noticeable lack of spring burning and the over-water nesting cover apparently escaped destruction this spring in contrast to 1962. Such crops that had germinated were blackened in the Brandon-Neepawa area by frost on May 20 and considerable reseeding had to be done. In general, soil moisture favored an excellent crop of small grains.

The clearing of the aspen parklands continues at a rapid pace. Viewed from the air the contrast in amount of wooded area present in 1956 with that visible now in eastern Manitoba is astounding. Entire sections once practically covered by aspen are now open fields dotted by small wetlands.

Aspen and willow leaves developed rapidly after mid-May as did the marsh vegetation in the shallow ponds. It was not thought, that visibility from the air was seriously hampered as a result.

Habitat conditions for waterfowl in southern Manitoba during July were improved over those of 1962 and 1961 and approach those of 1960. July pond numbers were still down a third from the 10-year average for the area (table D-5, p. 107). The May 1963 report indicated that many southern Manitoba ponds were shallow and would dry up without additional rain. In general, the summer rainfall has been sufficient to maintain and increase water levels in many such ponds and brood water was available over most of the survey area.

Pond vegetation was heavy during July as it was in July 1962 and hindered observations by the aerial crew.

The 1963 July pond index for strata A and B was 39 percent greater than the index for July 1962. But again, the pond index remains 32 percent below the 10-year average for southern Manitoba. Water conditions in stratum A in 1963 was better than those of 1962 or 1961 and it is necessary to go back to 1957 for a year with substantially better July water than 1963.

Breeding Population Indexes

Table E-28, p.126 compares the waterfowl breeding population indexes for the years

1955 through 1963 in southern Manitoba. Table E-29, p. 127, presents the breeding population by species, by strata; and compares the 1963 population with that of 1962 and the average population found during the period 1953-1962.

The breeding duck population in southern Manitoba in 1963 is 34 percent greater than that found in 1962. Dabbling ducks were up 43 percent and divers, 16 percent. The 1963 coot population is 60 percent greater than 1962. These are substantial increases over the low population levels of 1962. But to view these gains in the proper perspective, the 1963 index needs to be measured against the more normal or average conditions of the past 10 years.

The 1963 breeding duck population in southern Manitoba is still 25 percent below the average of the past 10 years. Both diving duck and coot populations are about average but the important dabbling duck breeding population is still 32 percent lower than the average for the last 10 years.

Redhead breeders increased markedly (150%) over 1962 and 1963 levels were 76 percent higher than the average redhead breeding population found in the 1953-1962 period. Canvasback are up 33 percent over 1962 and the current population is equal to the average found between 1953 and 1962.

As a final comparison it is noted that in only 2 years (1953 and 1962) of the last 10 years were the breeding population indexes lower than this spring. In southern Manitoba 1962 was the worst year on record and it need be remembered that the 1963 gains are measured against the very low indexes of last year.

Despite the increased number of breeders, a substantial part of the available habitat in southern Manitoba remained unused by breeding waterfowl in 1963. It does not appear that this gap can be explained solely by the increased number of water areas recorded in 1963.

The ratio of lone drakes to total drakes observed is considered an indicator of the progress and intensity of the nesting effort. The higher the percentage of the lone drakes recorded the earlier the nesting season is assumed to be. The 1963 lone drake figure of 80 percent is a considerable improvement over the 1962 figure of 62 percent (lowest on record) and is about average for the last 10 years (table E-30, p.127).

Other evidence that 1963 was an early nesting season was provided by ground crews

who reported several mallard nests under incubation in early May. Also, the aerial crew observed on brood of ducklings on May 22 and 3 broods on May 23.

Production Indexes

The 1963 duck brood index for southern Manitoba is 107 percent greater than that of 1962 and only 9 percent below the average index for the last 5 years (tables F-33, F-34 and F-35, pp. 153 and 154). The coot brood index is down compared to last year despite a threefold increase of coot broods in stratum A. Counts in stratum B declined this year and depressed the production index for southern Manitoba. There is little question, however, that coot broods are much more abundant in the Manitoba Prairie area this summer than 1962.

The 1963 index to late nesting for the survey area is up 148 percent over that recorded in 1962. Mallards, pintails, red-heads, and ruddy ducks are well represented in the 1963 late-nesting index. There appears to be a good late-nesting effort in Manitoba. Despite the improvement over last year, the 1963 late-nesting index is still 22 percent below the average for the period 1958 to 1962.

The age classes of 228 broods are summarized in table F-36, p. 155. The distribution of brood age classes as recorded was unusual this year because very few class I broods were noted. The reasons for the scarcity of class I broods in southern Manitoba are uncertain but may be related to the timing of the late-nesting effort and the generally high water levels and dense vegetation in those parts of stratum A where broods were most abundant. Whatever the reasons, few class I broods were recorded in Manitoba in 1963 and this item has depressed the current forecast index for the area. Average brood size increased .1 bird above 1962 but was still .2 birds lower than the 10-year average.

Conclusions

The index for 1963 is 51.8 and only 1962 (51.0) has been lower since the start of our records. This low forecast index occurs in spite of a duck brood index of 107 percent greater than that of 1962, a breeding pair index of 148 percent greater than last year,

a July pond index of 39 percent greater than last year, and an average brood size of .1 bird larger than 1962. It would appear that the low number of class I broods recorded has had an overwhelming influence on this year's forecast index.

Duck production in southern Manitoba in 1963 was better than 1961 and shows a moderate increase above 1962.

Even though the habitat makes a strong recovery, the Manitoba forecast index cannot rise substantially until more breeding waterfowl are returned to Manitoba.

SOUTHWESTERN MANITOBA

Data supplied by Ducks Unlimited (Canada)

The 78 roadside transects distributed within the 10,790 square-mile habitat block in southwestern Manitoba (FWS stratum A) were censused May 13-18, 1963, to measure annual trends in duck breeding populations and water conditions. Inventory methods were comparable with those of the past 3 years.

Weather and Habitat Conditions

Habitat for breeding waterfowl was found to be significantly improved over 1962; in fact, there are more ponds this year than at any time since 1958. A total of 1,694 water bodies was recorded in 1963, an increase of 44 percent over the 1,178 observed in 1962, 77 percent over the 903 recorded in 1961, and 20 percent above the 1960 figure of 1,414 water areas. Pond densities were 18.2 (1960), 11.9 (1961), and 15.1 (1962), and 21.7 (1963) areas holding water a square mile of transect. These were classified as shown in tables D-6 and 7, p.108.

The apparent reduction in the number of dugouts is due in part to flooding and consequent reclassification into the "other" category, and to visibility changes which obscured water from view.

Mudflats were scarce this year, in contrast to 1962 conditions, with water now present well within the emergent stands of most pond peripheries. Most mudflats still exposed were observed on the deeper, semi-permanent ponds in the extreme eastern Tiger Hills where recovery from the recent drought has progressed at a slower pace. Many of the deeper marshes and lakes are still

low, sometimes as much as 2 to 3 feet below recent predrought levels. For example, Oak Lake, Lenore Lake, and the large marshes south of Griswold are still low and in poor condition.

Burning of pond margins appears to have been more prevalent during the past dry winter and spring than during the previous year, often with the result that little or no nesting cover remained for the early nesting species. Where burning did not occur, however, both upland and emergent cover were much improved over their 1962 condition. Water could frequently be found standing throughout the sedge and whitetop vegetation zones, and in the wetter districts flooding back through willows and terrestrial grasses.

Destruction of wetland habitat by filling as a result of agricultural brush clearing operations has been greatly accelerated during the past winter. Five ponds located within the transects were filled prior to 1962; while 14 ponds were filled during the past year. This figure includes only those ponds whose value to nesting ducks would likely be eliminated—many others have been partially filled, but are still probably usable by breeding pairs, though at a reduced occupancy rate.

Water conditions varied by region and ranged locally from poorer than last year to significantly improved over 1960.

East of La Riviere water conditions are poor. Only 9 water bodies were recorded for 3 transects, a 76 percent reduction below the 43 ponds noted in 1962 and well below the 31 observed in 1960. The same condition, with pond numbers reduced below the 1962

level, but by a lesser degree, extends west as far as Mariapolis - Clearwater, or just into the eastern edge of the Tiger Hills.

Also in poorer condition than in 1960 was the pothole habitat north of Whitewater Lake where pond numbers were recorded as still reduced 32 percent below the 1960 level, and about the same as in 1961-62.

These are the only extensive areas where a substantial recovery from the recent drought was not observed.

In the important morainic habitat of the Tiger Hills and Minnedosa Hills a 22 percent increase in water bodies was recorded over 1962 and 17 percent over 1960.

The large block of till-plain habitat west of St. Lazare - Virden - Melita showed a profound improvement this spring, with an increase of 202 percent in ponds recorded over 1962, and 40 percent over 1960. Though much of this water was of a temporary nature at the time of census, heavy rains following the survey should virtually insure sufficient water for brood survival.

Also exhibiting a marked increase in water areas was the habitat block of till-plain south of the Minnedosa River and Highway 45 and north of Highway 24. This change was recorded at 19 percent over 1962 and 36 percent over 1960.

Since mid-May heavy rains have been general across southern Manitoba. Rainfall ranged from 2.69 inches at Russell to 5.8 inches at Pierson during the period of May 21 to June 13. Total and normal precipitation for this period are shown below for the various reporting stations in southwest Manitoba:

Summary of Precipitation May 21 - June 13, 1963

[in inches]

| <u>Station</u> | <u>Total</u> | <u>Normal</u> | <u>Departure from normal</u> |
|----------------|--------------|---------------|------------------------------|
| Rivers | 3.47 | 2.28 | + 1.19 |
| Boissavain | 3.80 | 2.33 | + 1.57 |
| Brandon | 3.03 | 2.20 | + 0.83 |
| Cypress River | 2.74 | 2.13 | + 0.61 |
| Pilot Mound | 4.68 | - ? - | - ? - |
| Pierson | 5.80 | 2.19 | + 3.61 |
| Russell | 2.69 | 1.67 | + 1.02 |
| Virden | 3.51 | 2.25 | + 1.26 |

Greatest rainfall appears to have occurred where permanent brood water was in shortest supply—in the extreme southwest.

Phenology was about average as compared with the past 3 years, but considerably behind

the early seasons of 1958-59. Vegetative development at the beginning of the survey period was slightly ahead of 1961-62. Subsequently, cool, wet weather slowed development to about the same level as last year.

Most aspens were observed to be in the "mouse-ear" stage of leaf development.

The progress of the survey from southwest to northeast just about kept pace with advancing phenological development, except in the Riding Mountain area where many aspens were still without leaves at termination of the survey. New cattail and sedge growths were high enough to interfere with visibility, probably to a greater degree than in 1962.

Breeding Population Indexes

Spring migration began at least 2 weeks earlier than last year, with mallards and pintails common in southern Manitoba by April 1.

The warm period of April 12 to 15 likely initiated nesting in the mallard and pintail; some hens were laying by April 17. By the last week in April, the majority of the mallard and pintail hens appeared to be laying, while some hens were already incubating. Nesting chronology in the two species appeared to be advanced at least 1 week ahead of 1962 and 2 to 3 weeks ahead of 1961.

Canvasback nesting chronology appeared to be similar to, or slightly ahead of, that of the mallard and pintail. By mid-May canvasbacks males were common in groups of four to five, with occasional larger groups observed.

Some blue-winged teal hens were laying by May 15, though most were still in the pre-laying phase of the breeding cycle at that time.

The scaup migration appeared to have largely terminated by the time the transects were run—fewer large groups were seen than in 1962.

The lone drake index (percent of indicated pairs made up of lone drakes or small groups of drakes) for the mallard, pintail and canvasback shows nesting chronology to be advanced ahead of 1961 and 1962 and about the same as in 1960 (table E-31, p.128).

Late May and early June were cool and wet. Light snow was general in southern Manitoba, May 18-20. Whether this was severe enough to affect nesting success and retard hatching of the mallard, pintail and canvasback is not yet apparent.

Waterfowl breeding population indexes for 1960-63 are given in tables E-32, and E-33, pp. 128 and 129. The total waterfowl index was 2 percent above the 1962 level, but still 27

below 1960. Diving duck populations were recorded at 15 percent below last year and 37 percent below 1960, while for the dabbling species an 8 percent increase over 1962, but a 24 percent decrease below 1960, were recorded. Duck densities a square mile of transect were 34 in 1963, 33 in 1962, 41 in 1961, and 47 in 1960.

Numbers of pintail, shoveler and scaup remained relatively unchanged from last year, with recorded changes ranging from 4 percent to 6 percent from 1962. For the mallard and baldpate, moderate decreases of 10-15 percent were recorded. The mallard breeding duck index is 11 percent below 1962 and 31 percent below 1960. Gadwall, canvasback, and redhead showed reductions of some 20 to 30 percent below 1962. The blue-winged teal and ruddy ducks both increased greatly, with respective indexes of 51 percent and 75 percent above 1962.

MINNESOTA

Data supplied by Harry Pinkham,
Bureau of Sport Fisheries and Wildlife,
and Minnesota Department of Conservation

Weather and Habitat Conditions

Favorable water and restrictive hunting seasons during the past few years have benefitted ducks in Minnesota at a time when drought over the expansive prairie areas of the Dakotas and Canada prevented birds from breeding in these areas.

Good water levels in wetlands this spring have remained relatively high during the summer.

Breeding Population Indexes

The duck outlook in Minnesota is good. Breeding birds were reported in good numbers throughout most of the State. Numbers of mallards and large divers, canvasback and redhead, improved in northwestern Minnesota. Blue-winged teal populations in western and northwestern Minnesota remained about the same, but showing some increases south of the Minnesota River. Wood ducks were more abundant and widespread than they have been for many years (tables E-34, 35, and 36, pp. 129 and 130).

Production Indexes

Stable water combined with generally dry weather during the hatching period has favored a good hatch and survival of ducklings. (table F-37, p. 155).

Conclusions

Duck production in Minnesota is the best observed for some time.

SPECIAL STUDY³

Weather and Habitat Conditions

The annual Chippewa National Forest waterfowl census was conducted for the twenty-second time since 1937. The method, time, and technique were identical with the previous year.

The water level reading at the Winniebigoshish Dam at the time of the census was 9.9 feet, which is .5 feet below normal for this period, and was 1.7 feet below the reading at the dam site during the 1962 census.

Aquatic vegetation, both emergent and submergent, was more abundant in the census area than during the 1962 census. The wild rice stands improved over the past year and other aquatic vegetation was about normal for the area.

Breeding Population Indexes

Results of the 1963 waterfowl census as compared with previous years are shown in tables E-37 and E-38, pp. 131.

Production Indexes

Production information obtained from the survey is shown in tables F-38 and F-39, pp. 156.

Conclusions

This year's waterfowl survey indicated a 35 percent decrease as compared with 1939-40 and a 108 percent increase from 1962. The population increase over 1962 may have

³Data supplied by Harry Pinkham

resulted from the lower water levels in the area which caused a greater concentration of birds on the lakes and a general increase in population.

The marked increase in the number of broods counted in 1963 as compared with 1962 is contributed to more favorable weather conditions which resulted in better nesting habitat.

MICHIGAN

Data supplied by Merrill L. Petoskey
Michigan Department of Conservation

Weather and Habitat Conditions

The winter was severe with the heaviest snowfall along the west side of the Lower Peninsula. Temperatures averaged below normal through much of January, February, and March. Several new record lows were set in southern Michigan during February. Near normal temperatures began to occur during the last week in March. We feel that the earlier subnormal temperatures delayed migration by as much as 2 weeks.

Precipitation was below normal in the northern part of the State and above normal in the southern part during the late winter and early spring. April, May, and June weather was reasonably good for nesting but high winds and hail may have resulted in some nest destruction and loss of ducklings. Offshore winds caused high water in the Saginaw Bay marshes which resulted in the destruction of many blue-winged teal nests. Several record lows were set during the last week of May with temperatures averaging 5 to 12 degrees below normal. Precipitation during June was far above normal for the entire State. The Lansing area received 4.35 inches of rainfall on the 7th of June, establishing a new record for a 24-hour period.

Breeding Population Indexes

Counts of potential breeding wood ducks were made during regular census trips. No special observations are made on the wood duck. All observations are made in conjunction with those on other species. Most of the areas censused do not contain

very much of what is considered to be ideal wood duck habitat. The results of the counts follow on table E-39, p. 131.

The number of breeding wood ducks a lineal mile of census route was the highest ever recorded. Wood ducks made up 10.4 percent of the local nesting species, higher than last year. Broods contained an average of 6.5 young.

Check of use of nest boxes by wood ducks was discontinued 3 years ago. We felt that the data gathered was unreliable.

Production Indexes

Number of broods observed a lineal mile was the highest on record. Brood size was about average. The number of bachelor birds observed was lower than last year and well below the high of 1960 (table F-40, p. 156).

Conclusions

Migration was delayed again this year by cold weather and ice conditions. Most districts reported poorer water conditions during the migration and at the time of breeding ground census. In spite of this, the potential breeding population was the highest in the years of record. Undoubtedly, the low water conditions caused some changes in breeding activities but there were no apparent effects. Heavy precipitation during June provided much more useable water. However, water areas are not considered to be a limiting factor to waterfowl production in Michigan.

IOWA

Data supplied by Bob Barratt,
Assistant Superintendent of Game
State Conservation Commission

Breeding Population Indexes

Although waterfowl flights from the south arrived as much as 2 weeks early this spring on the breeding grounds, early nesting was reflected only by such species as the mallard and wood duck. Late nesting species including the blue-winged teal, redhead, ruddy and coot, also arrived on the breeding grounds approximately 2 weeks early but nesting was delayed until approximately 1 week later than

normal. The only apparent cause for this delayed nesting was several nights of below freezing temperatures in mid-May. This is the only factor which apparently could have caused this delay in nesting activity

Production Indexes

Information from drive trapping crews shows that on areas where the habitat is comparable to that of 1962, blue-winged teal production is approximately 25 percent higher. Wood duck production shows an increase of 10 to 15 percent. Mallard production has shown a very slight increase over 1962 while most other species remain about the same. Redhead production in the State has probably declined as much as 50 percent because of the loss of emergent vegetation as a result of several years of high water and high muskrat populations. Ruddy ducks on the other hand appear to be about as numerous as last year. Coot production has been drastically reduced due to the loss of vegetation and on many areas production is down 75 percent from 1962.

Banding activities indicate that many broods of mallards, pintails and wood ducks are now on the wing. A few early broods of blue-winged teal are just beginning to fly. Less than 10 percent of the birds taken in drive-trapping operations during the week of July 15 were class I birds.

To date our banding crews have taken approximately 2,000 birds of which about 70 percent have been blue-winged teal. Coots, mallards, pintails and wood ducks made up the bulk of the banded birds.

Conclusions

In summary, blue-winged teal in Iowa were up approximately 25 percent, wood ducks up 10 to 15 percent, and mallards up slightly. Redheads and coot were down sharply and others apparently unchanged.

INDIANA

Data supplied by David M. Brooks
Indiana Department of Conservation

Production Indexes

The nine stream sections: Maumee, Elkhart, Iroquois, Big Blue, Mississinewa, West

Fork of the White, Eel and Muscatatuck Rivers and Salt Creek, were censused by use of an outboard motor powered boat. A total of 150 wood duck broods was observed on these streams. This was the greatest number ever encountered, surpassing the 1962 count which had previously been the highest (table F-41, p. 157). This represents an increase of 16.3 percent over 1962 when 129 broods were recorded, a 32.7 percent increase over the 5-year average of 113.0 made from 1958 to 1962, and 59.2 percent greater than the previous 10-year average of 94.2 broods.

A total of 1,079 young wood ducks was observed in the 150 broods. Of these, a complete count of young was considered to have been obtained for 98 broods totaling 898 young, an average of 9.2 young per brood. This compares favorably with those of the past several years. Complete brood size ranged from 4 to 20 young. On the Muscatatuck River, one group of 42 young woodies, all of which appeared to be of the same age class were attended by two hens.

A total of 123 adult female wood ducks was seen with their broods and 27 broods were observed without a hen. Five broody wood duck hens were observed, but none of their broods were found. The Maumee, Elkhart, and Muscatatuck Rivers each had one of these broody hens while the Eel River had two. An additional 30 adult hens were observed without broods and 57 adult drakes were seen also. The sex of 38 adult wood ducks was not determined.

A mallard drake was seen on a sand bar on the White River. It did not fly when the boat passed and may have been a domestic bird. A female black duck with five young was observed on the Big Blue River, but a complete count was not considered to have been obtained on this brood.

Pulpwood cutting along the Big Blue River has probably reduced the nesting sites for wood ducks. The same situation probably exists in the salvage timber cutting along the Mississinewa River in the area to be flooded soon by a new impoundment.

MISSOURI

Data supplied by Missouri
Conservation Commission

Weather and Habitat Conditions

Precipitation during the fall and winter of 1962-63 was far below normal. Drought

conditions existed in many sections of Missouri from November 1962 through February 1963. Precipitation and temperatures increased to slightly above normal conditions in March but not enough to improve water conditions in wood duck production habitat. April temperatures remained 3-4 degrees above normal but drought conditions returned with rainfall showing less than 2 inches for the month.

Water levels in streams and marshes were below normal during much of the nesting period. Drought conditions during the census period increased the chances of site observations in the 1963 nesting surveys and must be kept in mind when comparing data with past years.

Production Indexes

Wood duck production continued to improve with the nesting efforts on lake, marsh, and stream habitat showing the highest productivity ever recorded in the State.

Wood duck nesting efforts a square mile of marsh and lake habitat increased by approximately 297 percent over 1962. Nesting efforts a mile of stream indicated only slight increases over last year (.32 to .33) but they still remain exceptionally high when compared to previous years (table F-42, p. 157).

Trend data as shown in table F-41 indicates increases in productivity in all categories. Most observers reported significant increases in production of wood ducks over last year with some indicating the best production ever witnessed in their respective sampling areas.

Mallard nesting efforts a square mile of lake and marsh habitat increased from .8 in 1962 to 4.3 in 1963. This large increase should not imply high productivity of this species for 67 of the 73 nesting efforts recorded were from lone drakes, lone hens and pairs. Only 6 broods were observed on approximately 17 square miles of lake and marsh habitat. Even though mallards are present in relatively fair populations, their production in 1963 was considered insignificant. High nest mortality by raccoons was probably the cause for low productivity.

Mallard nesting efforts on streams showed a significant decrease over the State but sample sizes are probably too small to accurately measure production of this species.

Only 16 nesting efforts were observed on both marsh and stream habitat for blue-winged teal. One brood was recorded on

the stream survey indicating production of blue-winged teal in the State to be insignificant.

ATLANTIC FLYWAY

WATERFOWL KILL SURVEY

An estimated 764,300 ducks were bagged in the Atlantic Flyway during the 1962-63 waterfowl season, an increase of 3 percent over the previous season (table A-14). An additional 191,200 ducks were knocked down but not retrieved, yielding a total kill (bag plus cripples) of approximately 955,500 ducks, a decrease of 2 percent from the previous season.

Analysis of the total Flyway duck bag by species, as derived from data provided by the Duck Wing Survey, shows that the bags of five species—black ducks (223,100), wood ducks (119,500), mallards (119,400), ring-necked ducks (48,100), and green-winged teal (45,000)—totaled 555,100 ducks or 73 percent of the Flyway bag of all species.

Four species of dabbling ducks registered the following bag increases over the previous hunting season (table A-14): gadwall (+82%), shoveler (+13%), black duck (+11%), and mallard (+10%). The bags of mottled and Florida ducks (combined) decreased 45 percent, and blue-winged teal decreased 24 percent. The following species of diving ducks registered bag increases: greater scaup (+107%), ruddy duck (+61%), bufflehead (+19%), and goldeneye (+8%). The bags of lesser scaup declined 47 percent and ring-necked ducks

declined 7 percent from the previous hunting season.

The total Flyway goose bag of an estimated 108,700 birds increased 27 percent over the previous season. An additional 16,000 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 124,700 geese. Eight States registered increases in the goose bag and none of the States showed decreases (table A-15).

An estimated 37,900 coots were bagged in the Flyway, an increase of 33 percent over the previous season. An additional 11,100 coots were knocked down but not retrieved, yielding a total kill (bag plus cripples) of about 49,000 coots.

At the State level, seven States registered decreases in total duck bag, whereas ten States registered increases. The kill in Connecticut increased 108 percent and New Jersey increased 105 percent because of increases in both the total number of active hunters and the kill per hunter.

A total of approximately 189,940 waterfowl hunters were afield during a total of 1,148,900 hunter-days (table A-16), registering increases in these estimates of 2 and 4 percent from the previous season.

WING COLLECTION SURVEY

Flyway-wide age ratios of the more important species of ducks in the kill during the 1960-61 and 1962 hunting seasons in the Atlantic Flyway are listed in table B-2, p. . During the 1962 hunting season, 9 of the 13 species considered here showed a decrease from the 1961 ratio of immature to adult birds.

Mallard age ratios from most of the more northern States of the Flyway generally contained fewer immatures per adult in 1962 than in 1961. Age ratios from the southern half of the Flyway showed little change from last

year. The weighted flyway-wide age ratio indicated a decline in the number of immatures in the kill during the 1962 season (table B-3).

Black duck age ratios in each State in the Flyway for the 1960, 1961, and 1962 seasons are presented in B-4. The number of immature to adult black ducks in the 1962 kill showed a continued decrease from 1961 in nearly all States and in the Flyway-weighted ratio (table B-4).

The species composition of the kill in the Atlantic Flyway was similar to that obtained in 1961 with a few minor exceptions (table B-5, p. 78). The proportion of the Flyway kill made up of black ducks increased from

27.1 in 1961 to 28.9 percent of the total in 1962; wood ducks decreased from 17.1 to 15.8 percent of the total; and greater scaup increased from 2.1 to 4.2 percent of the total kill.

WINTER SURVEY

Data supplied by C. E. Addy, Atlantic Flyway Representative, Bureau of Sport Fisheries and Wildlife

Coverage this year was essentially comparable to that of last year. The bulk of the survey was conducted during the period January 7-15. Only in the St. Lawrence River area of northern New York was coverage delayed until late in January.

The usual surveys in eastern Canada and the United States were carried out. In addition, surveys were made in Puerto Rico and the Virgin Islands. But in these island areas only 865 ducks were recorded.

Visibility and flying conditions varied and local weather conditions momentarily interrupted coverage during the survey period in

various parts of the flyway. The northern half of the Flyway experienced severe cold with open water found only in outer tidal areas and larger inland freshwater habitats. Even the southern portion of the Flyway experienced below normal temperatures and drought was prevalent, particularly in South Carolina. It is believed that the early and continued severe cold in northern areas forced more birds farther south this year. Also, dry conditions in the south, particularly South Carolina, tended to concentrate birds in open waters where they were more readily observed by survey crews. These conditions could have a major effect, not only on the actual distribution of birds between years but on the proportion of birds present which are seen by the observers.

BREEDING GROUND SURVEY

EASTERN ONTARIO, QUEBEC, AND LABRADOR

Data supplied by E. B. Chamberlain and C. F. Kaczynski
Bureau of Sport Fisheries and Wildlife

Weather and Habitat Conditions

In the southern and western portions of Ontario breakup and weather conditions were nearly normal, although temperatures generally were below normal for the entire area. There was a heavy snowstorm in Ottawa, extending through Montreal and southeast into New England, on May 10-11. Water conditions in this portion of the survey area appeared to be good. Elsewhere the situation was different.

In the northern and eastern portions of the survey area temperatures were generally below normal. Breakup was retarded two to four weeks over much of the area. (As late as June 19 Squaw Lake at Schefferville had

not opened up sufficiently for float-plane operations, although it had started to open around the edges on June 12.)

Most of the water areas were considerably lower than normal and in some localities draw-down for hydro-electric and logging operations, even further lowered the levels.

Low water levels were also observed in 1962. Furthermore, a similar condition was noted by E. B. Chamberlain in the Northwest Territories west of Hudson Bay, in 1961. The occurrence of this condition over so vast an area suggests that even the remote Arctic is not immune to the effect of periodic droughts such as have occurred in more temperate climates during the past few years.

In the southern and western portions of the area during the time of the survey, weather was dry, forest fires were numerous, a few extremely large, and water levels continued below normal. These conditions covered roughly one-third of the survey area. Over the remainder, while water levels were generally below normal, periods of three to

four days of fog, rain and low clouds hampered flying operations. Wheeler Airline pilots, delivering fuel to sites on the mid-Canada line during late July and early August, stated that flying weather at Knob Lake was the worst they had encountered since 1957. During one period of two weeks it was possible to average only one day of flying out of four.

The low water levels noted above are not considered a serious habitat factor at this time. It seems certain that many nests and young birds were destroyed by the larger forest fires. In such areas where even a moderately intense fire usually removes topsoil and humus and exposes vast expanses of bare rock, the long-term effect on waterfowl may be greater than the immediate effect.

Breeding Population Index

Breeding population indexes are shown in tables E-40, E-41, and E-42 (pp. 132-134). It should be noted that in table E-40 the 1962 and 1963 data are based on a single expansion factor for the entire survey area and, therefore, are not comparable with the 1955 and 1956 figures which have been computed separately for each stratum. In all the tables the 1963 data are of questionable value. They illustrate the result of making a survey at the wrong time. The 1962 survey was started nearly three weeks too late because of a delay in getting the aircraft ready for this type of work.

However, while the data are of questionable value, (except to illustrate the importance of timing in these surveys) the trip was definitely worthwhile in that it provided valuable training for a new crew. The problems of operating with few navigational aids, widely scattered gas points, inaccurate charts and, usually, adverse weather conditions have all to be dealt with as a matter of course. Crew efficiency improved as experience demonstrated that these difficulties could be overcome.

In tables E-40 and E-42 the data were computed on the same basis for all years. While some of the variations in species numbers

are because of differences in sampling intensity in the various strata, most of them may be regarded as actual changes in species composition of the total population. It will be noted that except for 1963 there is reasonably close agreement in totals for dabblers, divers and geese. Considerable differences among years are apparent for scaup, goldeneyes, and ring-necked ducks. Data for the black duck and Canada goose agree rather closely. Since all crews involved were experienced in aerial observation of waterfowl the possibility of misidentification is probably negligible.

It seems unlikely that the three species of divers would have had such wide variations in actual numbers. This causes suspicion that the proper time for getting a reliable estimate of black duck and Canada goose populations may not be the right time for scaup, goldeneyes and ring-necked ducks.

Lone Drake Index

The 1962 and 1963 data were computed so as to be comparable with similar data obtained from a 1956 progress report concerning the lone drake observances in 1955 and 1956. These data are presented in table E-43 (p. 134).

These figures indicate that, over the entire survey area, considerable more nesting was in progress at the time of the survey in 1962 and 1963 than in 1955 and 1956. This is especially true in the open boreal and forest tundra strata where, in all years that the survey has been done at the proper time, the highest numbers of waterfowl have been found.

Waterfowl Production Indexes

There are no comparable data available for brood indexes. Since the data for 1955 and 1956 were based on three strata instead of the five in 1962 and 1963, they were not included in the tabulations. Comparison of the 1955-56 data with 1962-63 indicates that all strata should be surveyed to arrive at the best estimate for production and average brood size. For information purposes these figures follow:

| | 1955 | 1956 | 1962 | 1963 |
|----------------------------|--------|--------|--------|---------|
| Duck brood index | 28,900 | 26,900 | 88,000 | 150,000 |
| Average brood size | 4.62 | 4.49 | 4.96 | 5.24 |

More broods were seen in 1963 and the average size was larger than in 1962. Most encouraging was a 46 percent increase in the Canada goose brood index and an increase of 0.43 goslings in average brood size (table F-43, p. 158).

Late Nesting Indexes

The late nesting index for ducks could not be compared with years prior to 1962. Data for 1963 indicate practically no change for dabbling ducks, a small decrease in black ducks being offset by a small increase in mallards (table F-44, p. 159). A significant increase was shown for the diving species. This, however, was not a particularly comforting amount of information, since it was caused by a 44 percent increase in late nesting mergansers. All other species of divers showed a decrease in late nesters.

Late nesting geese showed a 500 percent increase from 3,000 probable later broods in 1962 to 18,000 in 1963. Adding these to the 193,000 indicated goslings from the brood index gives an estimated 254,000 young geese in the fall flight.

Conclusions

The Ontario-Quebec-Labrador survey area is not subject to the disastrous changes in habitat conditions that are normal to the Canadian Prairie duck nesting areas. Although changes in water levels are apparent during drought periods there is not the complete loss of water that occurs periodically in the prairie regions. Despite the relative stability of the habitat, survey data indicate wide fluctuations in species populations.

Since no surveys were conducted in this area during the years 1957 through 1961 one can only surmise that the 1962-63 increases in mallard and green-winged teal may be due to population shifts caused by the drought in the western regions.

This year's data indicate a substantial increase in the fall flight of Canada geese from eastern Canada. Dabbling ducks should be slightly up, compared to 1962 and diving ducks considerably higher, the increase in divers being confined to mergansers. Brood and late nesting indexes indicate that the ratio of young birds to adults should be substantially higher than in recent years for most species. Decreases in this ratio can be expected for scaup, goldeneye, and bufflehead.

MAINE

Data supplied by Howard L. Mendall,
Maine Cooperative Wildlife Research Unit

Weather and Habitat Conditions

The spring season was greatly retarded. Although ice-clearing dates were exceptionally late, the snow cover lingered far beyond average dates. The period from mid-April to May 20 was characterized by above-normal precipitation (including three spring snowstorms) and temperatures that were considerably below average.

As would be expected, breeding chronology was likewise retarded. Spring migration was late for black ducks, goldeneyes, and wood ducks. The first arriving black ducks found nesting habitat still under snow cover. Floods on some marshes of central and eastern Maine May 19-20 further aggravated the situation by causing some early nest losses. The later breeding ring-necked ducks and the blue and green-winged teal were closer to their usual schedules.

During the last 10 days of May and throughout all of June, a decided contrast in the weather pattern occurred. Temperatures were above average and there was a marked deficiency of rainfall. This resulted in a lowering of water levels to a point where rearing conditions for broods on some marshes, especially in central Maine, were a matter of concern. Average precipitation, so far in July has improved conditions.

Breeding Population Indexes

As explained in previous reports, initial breeding populations are determined from 13 study areas. Over a period of years these have proven quite reliable indicators for northern, eastern, and central Maine, especially for the two most numerous species--the black duck and the ring-necked duck. Data for other species have considerably less value in detecting annual trends.

The breeding population as a whole was disappointingly low in comparison with the high level of 1962. The substantial gain last year in the black duck was offset by a corresponding decrease this year. On the study areas, the species is approximately at the 1961 breeding level, lower than a 10-year

trend. An encouraging aspect is seen, however, in that the decline was measured almost entirely in eastern Maine and may have resulted in part from a later spring break-up in that portion of the State. Populations in northern Maine showed a little change from 1962. A slight increase was indicated in central Maine, although this is based on more limited data.

The ring-necked duck exhibited a modest increase which was gratifying after its heavy decline of a year ago. No special significance is attached to the decrease in blue-winged teal and green-winged teal since these species are secondary in Maine in any year. The high level of the previous 2 years reached by the blue-winged teal had never been attained in the past, insofar as is known.

A total of 27 nests (all ring-necked ducks and black ducks) were under observation. This is too small a sample on which to base strong conclusions relative to nesting success. Nevertheless, the data served well to supplement other observations as to the breeding success. By mid-July three nests were still being incubated. Of the remainder, 12 were successful and 12 were destroyed or deserted. Hatching success for the ring-necked duck was similar to the long-term average, but that for the black duck was much lower than usual. These limited data were substantiated on several study areas by observed ratios of breeding pairs to broods.

Predation was somewhat higher than usual in 1963, with the red fox being identified most frequently as the cause of loss.

Production Indexes

Major hatching periods for all species except the ring-necked duck have been considerably later than usual. This has been especially noticeable for the normally early nesting black duck and wood duck. The black duck hatching peak was not reached until approximately June 17, which is about 2 weeks later than the long-term average. This is believed due to a combination of the retarded seasonal phenology plus an appreciable number of early nest losses, with resultant renesting. By

contrast the ring-necked duck, a late nester, was little affected. Nesting success appeared average for this species, resulting in a hatching peak close to long-term average dates.

Based upon nest and brood observations 16 percent of black duck hatchings, and 25 percent of wood ducks, occurred after July 1—an unusually high proportion. It is obvious that many ducklings in Maine will not attain flight until September.

Average brood sizes are shown in table F-45 (p. 159). Very few class III broods had been recorded as of July 20. Comparisons of the other age classes with those of 1962 were favorable except in the case of the black duck. Average sizes of class I and class II broods of blacks were appreciably lower than a year ago. This would be expected with lower nesting success and later hatching peaks occasioned by more renesting.

Rearing success as a whole should be relatively favorable since average to slightly above average precipitation has occurred during the first 3 weeks of July.

Conclusions

Breeding populations of most species of waterfowl on Unit study areas were decreased from those of 1962. Only the ring-necked duck showed an increase. Most noticeable decline was in the black duck, although this was largely confined to eastern Maine.

Nesting success was lower for the black duck but higher for the ring-necked duck than that a year ago.

Breeding chronology was greatly retarded in 1963 especially for the early nesting species. A relatively high proportion of black duck and wood duck hatchings occurred after July 1.

Rearing conditions in most marshes were considered fairly satisfactory although not as good as a year ago.

Considering both initial populations and nesting success, it may be expected that, with the exception of the ring-necked duck, waterfowl production on the areas studied in 1963 will be lower than in 1962.

WATERFOWL SITUATION

SUMMARY AND FALL FLIGHT FORECAST

Analysis supplied by Walter F. Crissey
Bureau of Sport Fisheries and Wildlife

The breeding ground survey conducted during May and June provides the most reliable measure of trend in population of most species of ducks important to the hunter. A recent improvement in this survey has provided estimates of the proportion of birds present that are seen and recorded by the aerial crews. With this improvement, it is possible to estimate the total breeding population of the most important duck species in North America. The population trend for all ducks except scoter, eider, merganser, and oldsquaw is presented in figure H-1, (p. 163) for the period 1950-1963. It is important to note that the breeding population in the spring of 1962 reached a point which was 38 percent below the average of the previous 12 years; 47 percent below the peak population reached in 1956; and 17 percent below 1961.

Another series of data related to the period begins in 1953 when the survey to measure kill was developed to a point where the Bureau could begin to rely on the results. The estimated kill of ducks by flyway for the period 1953-1962 is shown in figure H-2 (p. 164). Proportionately, the decrease in kill of ducks since 1957 has exceeded the decrease in breeding population. Specifically, the estimated number of ducks bagged reached a peak of about 12.8 million in 1957 and decreased to about 3 million in 1962, a decrease of about 75 percent. The breeding population reached a peak in 1956 and by 1962 had decreased 47 percent. This difference is as it should be. During the mid-1950's when habitat conditions were good and production ratios were high, hunters were killing a large portion of the fall flight without reducing the population level. In 1962, there were few young in the fall flight and only a small portion of the population could be killed if the population level was to be maintained.

The difference in kill rates between the mid-1950's and the early 1960's is confirmed by banding data. When corrected for non-reporting rate, of which we have a measure, the portion of banded birds that are

taken and reported by hunters can be used to measure the portion of the population that is bagged by hunters. Particularly in the Central and Mississippi Flyways, band recovery rates for important species have decreased markedly in the last 2 or 3 years, coincident with the very restrictive regulations.

It is significant to note that band recovery rates associated with the Pacific Flyway have not decreased nearly so much and are now considerably higher than in either the Central or Mississippi Flyways. This is not surprising in view of the longer season and larger bag limit in the Pacific Flyway, but it means that hunters there are now killing a higher portion of the birds available to them during the shooting season than are hunters in the other flyways.

In figure H-2 the pattern of decrease in kill for the period 1958-1962 in the Pacific Flyway is very similar to the pattern of decrease in the Central and Mississippi Flyways. In all three flyways, there was a marked decrease in 1959, no change or a slight increase in 1960, a sharp decrease in 1961, and another decrease in 1962. With a measure of kill for each year, and with a measure of the proportion this kill was of the total population present, as supplied by band recovery rates, it is possible to estimate the comparative size of the population available to hunters during the shooting season. When this approach is applied to the Pacific Flyway for the period 1958-1962, it leads to the conclusion that during the shooting season the number of ducks available to hunters has decreased about 50 percent for the period.

Another series of data of extreme importance is derived from a combination of age ratio data from our wing collection surveys and mortality estimates from banding. Sufficient data are now available from the wing collection surveys conducted during the period 1959-1962 that are quite specific concerning the overall production rates for those years. In addition, mallard age ratios determined by a less efficient method and obtained primarily from the Mississippi

Flyway provide a measure of production success for mallards as far back as 1939. These data demonstrate that production ratios can vary from a high of about 4 young a pair of adults during periods of good breeding habitat conditions to a low of about 1 young a pair in the fall flight. In 1960 there was considerable improvement when 2.6 young a pair were recorded. In 1961 and 1962 the ratios were quite similar, averaging about 1.4 young a pair.

Total annual mortality can be determined from banding. When information on production ratios obtained from the wing collection survey is combined with a measure of mortality from banding, a comparison of the two rates provides a measure of the net change in population levels which can be expected in a given year. The decrease in population level since 1958 is confirmed by this approach.

Thus, the Bureau is not dependent on a single source of information for determining the answers to many population status problems. A series of surveys are now operating which complement each other to a marked degree. When data from two or more sources agree, greater reliance is placed on the results. When they disagree, often the reason for the discrepancies can be understood.

A subject of considerable importance is the effect of kill by hunters on waterfowl population levels. For several species of resident game there is an accepted game management principle that kill by hunters has little effect on the number of birds that will be available the following fall. This is not the case with waterfowl. During the past year, research at the Migratory Bird Populations Station, Laurel, Maryland, has demonstrated conclusively that survival of several species of waterfowl important to the hunter has been controlled to a marked degree by means of appropriate shooting regulations. The evidence is clear that for several important species of waterfowl, a high portion of the birds will survive from one year to the next if they are not shot. This is important during periods of low production, such as the one just experienced. It is clear also that even with decreased populations, the gregarious

nature of waterfowl causes them to concentrate in many locations where liberal regulations would result in a large kill. During periods of low production, a large kill could have no other result than to reduce the breeding population the following year. The Bureau has concluded that shooting regulations constitute a powerful and most necessary tool for managing the waterfowl resource.

There seems no question but what the backbone of the drought period has been broken. The May pond count in the southern portions of the Prairie Provinces increased 17 percent as compared to 1962, but is still 36 percent below the average for the period 1951-1962 and 60 percent below the peak level recorded in 1955. Rains during the summer period increased the July count this year by approximately 100 percent over the average of the previous 12 years and 52 percent below the peak level reached in 1955 (figure H-3, p. 165).

In the Dakotas and western Minnesota, the May pond count increased 18 percent as compared to last year, while the July count increased 7 percent over the previous year. However, water conditions in the eastern Dakotas and Minnesota improved greatly last year, which means that the count this year represents improvement over a situation that was already favorable.

For the most part, weather conditions favored production this year. The weather was mild in late April and early May throughout much of the pothole breeding range, fostering early nesting. Although a heavy snowfall on May 19 in some pothole areas followed by temperatures of 20° or lower throughout much of the important Canadian breeding areas a day or so later, may have disrupted nesting.

Above-average precipitation during the summer throughout most of the pothole breeding range resulted in a moisture condition which fostered renesting. Also, this precipitation will provide a soil moisture condition favorable to runoff next spring.

FALL FLIGHT FORECAST

General

In Alaska, a 15 percent reduction in breeding population was recorded during

May. However, weather conditions were favorable during the nesting and brood period and production is expected to increase markedly as compared to the poor success

experienced last year. A small increase in fall flight from Alaska is expected. In the Northwest Territories along the MacKenzie River drainage, breeding population remained about the same (-8 percent). Production prospects are poor due primarily to cold weather late in May. They were poor also in 1962, which means that a change from the below average fall flight of last year is not expected. In northern Alberta, an increase of 25 percent in breeding population was recorded this year as compared to 1962. Habitat conditions improved and it is expected that the fall flight from this section will increase considerably. In northern Saskatchewan, the breeding population increased slightly (+13 percent), and in northern Manitoba it remained about the same (-5 percent). Habitat conditions in these two areas were favorable so that increases in both production and fall flight are expected.

In Ontario, a decrease of 49 percent was recorded in the breeding population and, although production appears to be good, it will not offset the large decrease in breeding population and a decrease in fall flight is expected. In southern Alberta, the breeding population increased 13 percent as compared to 1962. Production is judged to be much improved and the fall flight is expected to increase considerably. In southern Saskatchewan, the breeding population increased 10 percent. Habitat conditions did not improve as much as they did in southern Alberta and, although production is expected to increase, the amount of increase in fall flight will be less, proportionately, than in southern Alberta. In southern Manitoba, a 34 percent increase in breeding population was recorded during May. An increase in production is expected but nesting effort was disrupted by adverse weather during late May and only a moderate increase in fall flight is expected.

Stateside, and beginning in the West, there were increases in some portions of Washington State and decreases in others. It is expected that the fall flight from that State will be about the same as last year. In Oregon, the drought of the past few years seems to have broken and increases were recorded both in breeding population and in production. Essentially the same situation holds true for California, Nevada, Idaho, Utah, and Wyoming. In Montana, habitat conditions improved in the eastern portions of the State and deteriorated in the western part. Surveys in May revealed the highest breeding population index in Montana since the surveys were initiated. Pro-

duction is expected to be good and an increased fall flight is expected. In the Dakotas and western Minnesota a 32 percent increase in breeding population was recorded during May. Data on production collected during July revealed that production will increase above last year and an increase in fall flight is forecast. In Nebraska, a major increase in breeding population was recorded during May and surveys during July revealed a similar increase in production. A major increase in fall flight is expected from this State. In Colorado, the breeding population remained unchanged as compared to 1962 (+7 percent). Since water conditions were poorer than last year, it is anticipated that the fall flight from Colorado will remain essentially unchanged as compared to a year ago. Surveys in Michigan reveal increases both in breeding population and production, and an increased flight is forecast.

The only area reporting in the Northeast was Maine, where surveys revealed a decrease both in breeding populations and production.

Status of Canvasback and Redhead Ducks

The seasons on canvasback and redhead have been closed during the past 3 years. As a result of this protection, there is evidence that the population of these two species has improved. Specifically, redhead increased 13 percent as compared to 1962, while canvasback increased 83 percent. Redhead population now stands 14 percent below the average for the past 10 years, and canvasback are 11 percent below. These increases are encouraging. However, much of the canvasback breeding population increase this year occurred in northern Alberta and particularly in the Northwest Territories where successful nesting was problematical. Regardless, over-water nesting habitat was much improved in the southern parts of the Prairie Provinces and in the Dakotas. Increased production is expected this year.

PACIFIC FLYWAY

Ducks

When considering only the breeding areas which supply birds to the Pacific Flyway, a moderate increase is expected in the fall

flight of ducks as compared to 1962. Production ratios, as reflected by age ratios in the kill, should be approximately equal to 1960. It is emphasized that this increase is in relation to the 1962 fall flight which was about 50 percent below the level reached in the mid-1950's. The number of mallards in the Columbia Basin should increase over the high level of the past several years.

Geese and Brant

According to the annual winter survey, populations of all geese except cacklers decreased in January 1963, as compared to the previous year. Cackling geese increased 25 percent, while Canada geese decreased 22 percent, Ross's geese decreased 10 percent, snow geese decreased 11 percent, and white-fronted geese decreased 36 percent. Since production data for geese are lacking, average production must be assumed. Therefore, it is estimated that the fall flight of all geese will be the same as in 1962, but as compared to 1961, the flights of cackling geese will be larger, while the flights of Canada, Ross's, snow, and white-fronted geese will be smaller.

The number of wintering brant decreased a small amount for the second consecutive year. Also, a severe storm during the nesting season on the Yukon-Kuskokwim breeding ground completely eliminated production from this important area. Recently, a crew captured 4,000 brant for banding in this area without finding a singly immature. It is expected, therefore, that the fall flight of brant this year will show a sharp reduction.

Coots

Production of coots in most important breeding areas is expected to be better and a small increase in the fall flight of this species is anticipated.

CENTRAL FLYWAY

Ducks

It is anticipated that there will be at least a moderate increase in the fall flight of ducks in the Central Flyway as compared to 1962. The age ratios in the fall flight should at least be as good as in 1960, or perhaps

better. It is emphasized, however, that the breeding population this year was smaller than in 1960 and was markedly smaller than during the mid-1950's.

Geese

All wintering geese in the Central flyway increased in January 1963 as compared to the previous year, with Canada, snow, and white-fronted geese increasing 23 percent, 85 percent, and 147 percent. Since goose production data are lacking, average production is assumed. Therefore, it is expected that the fall flight of all species of geese will be the same as in 1962. Compared to 1961, it is expected that the fall flight of Canada geese will increase a small amount, while the flight of snow and white-fronted geese will increase considerably.

Coots

The production of coots in most important breeding areas has increased this year. Therefore, a small increase in the fall flight of this species is expected.

MISSISSIPPI FLYWAY

Ducks

It is anticipated that there will be at least a moderate increase in the fall flight of ducks in the Mississippi Flyway this year. The age ratios in the fall flight should be at least as good as 1960 or perhaps a little better. It is emphasized, that the breeding population this year was smaller than 1960 and was markedly smaller than during the mid-1950's.

Geese

All wintering geese in the Mississippi Flyway increased in January 1963, as compared to the previous year. Canada geese increased 29 percent; snow, 53 percent; blue, 15 percent; and white-fronted geese, 61 percent. Since goose production data are lacking, average production is assumed. Therefore, it is expected that the fall flight of all geese will be the same as in 1962. Compared to 1961, it is expected that the fall flight of

blue geese will increase a small amount, the flight of Canada geese will increase moderately, and the flight of white-fronted and snow geese will increase considerably.

Coots

The production of coots in most important breeding areas has increased this year. Therefore, a small increase in the fall flight of this species is expected.

ATLANTIC FLYWAY

Ducks

In forecasting changes in the fall flight of ducks in the Atlantic Flyway, breeding ground survey data cannot be used to as great an extent as in the other three flyways. This is due primarily to a lack of adequate analysis techniques for the survey data in the important Quebec-Labrador breeding area. Experimental surveys are being conducted this year in this area, but they have not progressed to the point where reliance can be placed on the findings. Therefore, it is necessary to depend to a large extent on the results of the annual winter survey for determining trends in the breeding population for the Flyway.

The number of black ducks wintering in the Flyway remained unchanged as compared with 1962 (-2 percent). All ducks collectively, increased 7 percent with the chief increases occurring among mallard, shoveler, green-winged teal, redhead, ringneck, and goldeneye. Increases among these species were in part counterbalanced by decreases in scaup,

ruddy, and merganser. For the sixth consecutive year the wintering population index has remained at about the 2-1/2-million level as compared with the 5-year period 1952-56, when the index averaged nearly 4-1/4 million.

From western areas supplying the Atlantic Flyway, it is expected that there will be an increased fall flight this year. Since production survey data are lacking from Quebec and Labrador, it must be assumed that production will be average and the fall flight of ducks from this region will remain about the same as last year. When data from eastern and western areas are combined, it is estimated that there will be small increase in ducks this year.

Geese

According to the winter survey, populations of both Canada geese and brant increased as compared to 1962 (+15 percent and +39 percent, respectively). Since goose and brant production data are lacking, average production must be assumed. Therefore, it is anticipated that the fall flight of Canada geese and brant will be about the same as in 1962, but as compared with 1961, it is expected that there will be a small increase in the flight of Canada geese and a moderate increase in the flight of brant.

Coots

The production of coots in most important breeding areas has increased this year. Therefore, a small increase in the fall flight of coots is expected.

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APPENDIX

A. WATERFOWL KILL SURVEY TABLES

TABLE A-1.--Total potential and active hunters during the 1961-62 and the 1962-63 waterfowl hunting seasons

| State | 1961-62 | | 1962-63 | |
|-------------------|-------------------|----------------|-------------------|----------------|
| | Potential hunters | Active hunters | Potential hunters | Active hunters |
| Pacific Flyway: | | | | |
| Arizona----- | 7,899 | 5,969 | 6,546 | 4,807 |
| California----- | 133,642 | 108,335 | 135,581 | 106,854 |
| Idaho----- | 27,689 | 22,292 | 24,337 | 19,443 |
| Nevada----- | 5,882 | 4,765 | 8,678 | 5,970 |
| Oregon----- | 46,006 | 35,462 | 42,467 | 33,077 |
| Utah----- | 20,687 | 17,774 | 23,787 | 20,607 |
| Washington----- | 68,689 | 52,485 | 67,361 | 48,783 |
| Flyway total----- | 310,494 | 247,082 | 308,757 | 239,541 |

TABLE A-2.--Total potential and active hunters during the 1961-62 and the 1962-63 waterfowl hunting seasons

| State | 1961-62 | | 1962-63 | |
|-------------------|-------------------|----------------|-------------------|----------------|
| | Potential hunters | Active hunters | Potential hunters | Active hunters |
| Central Flyway: | | | | |
| Colorado----- | 28,359 | 21,666 | 17,201 | 13,010 |
| Kansas----- | 44,571 | 31,731 | 24,330 | 16,123 |
| Montana----- | 24,046 | 17,808 | 16,145 | 11,118 |
| Nebraska----- | 36,972 | 27,648 | 21,118 | 14,193 |
| New Mexico----- | 4,193 | 3,019 | 2,164 | 1,674 |
| North Dakota----- | 28,414 | 22,281 | 28,307 | 22,853 |
| Oklahoma----- | 27,494 | 16,844 | 16,418 | 11,105 |
| South Dakota----- | 33,808 | 27,744 | 31,145 | 24,198 |
| Texas----- | 76,208 | 53,315 | 57,062 | 43,682 |
| Wyoming----- | 5,696 | 4,394 | 4,058 | 3,040 |
| Flyway total----- | 309,761 | 226,450 | 217,948 | 160,996 |

TABLE A-3.--Total potential and active hunters during the 1961-62 and the 1962-63 waterfowl hunting seasons

| State | 1961-62 | | 1962-63 | |
|---------------------|-------------------|----------------|-------------------|----------------|
| | Potential hunters | Active hunters | Potential hunters | Active hunters |
| Mississippi Flyway: | | | | |
| Alabama----- | 6,299 | 4,840 | 6,861 | 5,490 |
| Arkansas----- | 20,739 | 16,857 | 10,356 | 8,622 |
| Illinois----- | 69,106 | 55,635 | 45,882 | 37,226 |
| Indiana----- | 22,728 | 16,299 | 17,396 | 12,861 |
| Iowa----- | 44,826 | 36,559 | 33,152 | 26,075 |
| Kentucky----- | 6,904 | 5,529 | 4,903 | 4,025 |
| Louisiana----- | 49,725 | 37,494 | 43,396 | 31,057 |
| Michigan----- | 70,406 | 54,808 | 54,061 | 41,958 |
| Minnesota----- | 92,873 | 82,764 | 85,076 | 72,135 |
| Mississippi----- | 7,765 | 5,571 | 7,744 | 6,413 |
| Missouri----- | 42,616 | 34,600 | 29,445 | 23,087 |
| Ohio----- | 27,075 | 22,041 | 21,855 | 17,904 |
| Tennessee----- | 16,855 | 13,955 | 8,723 | 7,270 |
| Wisconsin----- | 97,881 | 79,752 | 79,694 | 63,516 |
| Flyway total----- | 575,798 | 466,704 | 448,544 | 357,639 |

TABLE A-4.--Total potential and active hunters during the 1961-62 and the 1962-63 waterfowl hunting seasons

| State | 1961-62 | | 1962-63 | |
|---------------------|-------------------|----------------|-------------------|----------------|
| | Potential hunters | Active hunters | Potential hunters | Active hunters |
| Atlantic Flyway: | | | | |
| Connecticut----- | 6,605 | 5,227 | 7,597 | 5,678 |
| Delaware----- | 6,746 | 5,581 | 5,992 | 4,750 |
| Florida----- | 25,233 | 19,241 | 21,984 | 15,911 |
| Georgia----- | 7,081 | 5,705 | 6,280 | 4,655 |
| Maine----- | 7,679 | 5,978 | 8,505 | 6,806 |
| Maryland----- | 19,078 | 15,368 | 20,158 | 15,743 |
| Massachusetts----- | 18,537 | 13,321 | 18,288 | 12,938 |
| New Hampshire----- | 4,493 | 3,886 | 4,610 | 3,400 |
| New Jersey----- | 16,210 | 12,112 | 19,979 | 15,872 |
| New York----- | 57,204 | 38,521 | 53,214 | 36,328 |
| North Carolina----- | 19,106 | 15,566 | 21,775 | 17,378 |
| Pennsylvania----- | 27,344 | 21,364 | 29,428 | 24,547 |
| Rhode Island----- | 2,190 | 1,718 | 1,730 | 1,453 |
| South Carolina----- | 11,345 | 9,163 | 11,151 | 9,334 |
| Vermont----- | 3,850 | 3,041 | 3,883 | 3,107 |
| Virginia----- | 13,612 | 9,298 | 14,960 | 10,832 |
| West Virginia----- | 1,296 | 1,002 | 1,528 | 1,208 |
| Flyway total----- | 247,609 | 186,092 | 251,422 | 189,940 |

TABLE A-5.--Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in the PACIFIC FLYWAY during the 1961 and the 1962 hunting seasons

[Bag estimates adjusted for response bias]

| Species ¹ | 1961 | 1962 | Percent change |
|--|-----------|-----------|----------------|
| Ducks: | | | |
| Dabblers: | | | |
| Mallard----- | 668,700 | 558,300 | -17 |
| Gadwall----- | 39,700 | 45,200 | +14 |
| American widgeon----- | 352,800 | 231,600 | -34 |
| Green-winged teal----- | 251,300 | 235,200 | -6 |
| Blue-winged and cinnamon teal----- | 40,100 | 57,600 | +44 |
| Shoveler----- | 152,400 | 116,600 | -23 |
| Pintail----- | 381,700 | 388,600 | +2 |
| Wood duck----- | 13,400 | 10,000 | -25 |
| Divers: | | | |
| Redhead----- | 3,800 | 4,400 | +16 |
| Canvasback----- | 1,300 | 500 | -62 |
| Greater scaup----- | 5,200 | 33,000 | +535 |
| Lesser scaup----- | 24,800 | 19,400 | -22 |
| Ring-necked duck----- | 11,700 | 7,900 | -32 |
| American goldeneye----- | 16,400 | 13,300 | -19 |
| Barrow's goldeneye----- | 900 | 700 | -22 |
| Bufflehead----- | 20,100 | 21,800 | +8 |
| Ruddy duck----- | 24,900 | 21,800 | -12 |
| Miscellaneous: | | | |
| Scoter----- | 2,400 | 6,400 | +167 |
| Oldsquaw----- | 400 | 1,200 | +200 |
| Common and red-breasted merganser----- | 1,500 | 2,600 | +73 |
| Hooded merganser----- | 1,200 | 1,300 | +8 |
| Others and unknown----- | 300 | 2,400 | +700 |
| Total: ² | | | |
| Retrieved----- | 2,017,500 | 1,778,900 | -12 |
| Not retrieved----- | 462,500 | 366,400 | -21 |
| Ducks killed----- | 2,480,000 | 2,145,300 | -13 |
| Coots: | | | |
| Retrieved----- | 67,900 | 67,300 | -1 |
| Not retrieved----- | 58,800 | 30,000 | -49 |
| Coots killed----- | 126,700 | 97,300 | -23 |

¹ Species composition derived from the 1961 and 1962 duck wing surveys.

² Duck totals estimated to nearest thousand.

TABLE A-6.--Total bags, by species, and crippling losses of geese in the PACIFIC FLYWAY during the 1961 and 1962 hunting seasons

[Bag estimates adjusted for response bias]

| Species ¹ | 1961 | 1962 | Percent change |
|--------------------------|---------|---------|----------------|
| Geese: | | | |
| Canada goose----- | 68,700] | 131,400 | (!) |
| Cackling goose----- | 35,900] | | |
| Snow goose----- | 59,800 | 37,100 | (!) |
| Blue goose----- | 700 | 300 | (!) |
| White-fronted goose----- | 40,400 | 54,200 | (!) |
| Black brant----- | 6,200 | 11,200 | (!) |
| Totals: | | | |
| Retrieved----- | 211,700 | 234,200 | +11 |
| Not retrieved----- | 45,900 | 41,600 | -9 |
| Geese killed----- | 257,600 | 275,800 | +7 |

¹ Percentage changes in species bag omitted: 1962 species estimates derived from the Bureau's goose tail survey, 1961 estimates from mail questionnaire reports.

TABLE A-7.--Waterfowl hunting activity and bags of ducks and geese in the PACIFIC FLYWAY¹ during the 1962 hunting season, with 1961 season comparisons

[Estimates unadjusted for response bias]

| Hunting season | Duck bag limit | Days in duck season | Total active hunters | Hunter-days | | Duck bag | | Goose bag | |
|---------------------|----------------|---------------------|----------------------|-----------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
| | | | | Days per adult hunter | State total | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| Arizona: | | | | | | | | | |
| 1961----- | 4-8 | 68 ² | 5,970 | 5.07 | 28,800 | 3.91 | 22,100 | 0.71 | 3,800 |
| 1962----- | 5-5 | 68 ² | 4,810 | 4.94 | 23,800 | 4.78 | 22,300 | 0.41 | 1,900 |
| Percent change----- | | | -19 | -3 | -17 | +22 | +1 | -42 | -50 |
| California: | | | | | | | | | |
| 1961----- | 5-5 | 68 ² | 108,340 | 6.04 | 653,300 | 12.59 | 1,330,800 | 0.55 | 163,500 |
| 1962----- | 5-5 | 68 ² | 106,850 | 6.69 | 717,300 | 8.59 | 889,700 | 1.71 | 176,500 |
| Percent change----- | | | -1 | +11 | +10 | -32 | -33 | +211 | +8 |
| Idaho: | | | | | | | | | |
| 1961----- | 5-5 | 75 | 22,290 | 6.10 | 137,900 | 11.76 | 248,500 | 0.38 | 7,600 |
| 1962----- | 5-5 | 75 | 19,440 | 7.05 | 137,600 | 10.00 | 188,500 | 0.56 | 10,400 |
| Percent change----- | | | -13 | +16 | -- | -15 | -24 | +47 | +37 |
| Nevada: | | | | | | | | | |
| 1961----- | 5-5 | 65 | 4,770 | 5.11 | 25,000 | 6.68 | 30,900 | 0.67 | 3,000 |
| 1962----- | 4-8 | 65 | 5,970 | 5.82 | 34,900 | 6.92 | 40,000 | 0.72 | 4,100 |
| Percent change----- | | | +25 | +14 | +40 | +4 | +29 | +7 | +37 |
| Oregon: | | | | | | | | | |
| 1961----- | 4-8 | 75 | 35,460 | 5.97 | 213,700 | 7.13 | 246,800 | 1.13 | 40,100 |
| 1962----- | 4-8 | 75 | 33,080 | 7.78 | 258,300 | 5.56 | 178,200 | 1.24 | 39,400 |
| Percent change----- | | | -7 | +30 | +21 | -22 | -28 | +10 | -2 |
| Utah: | | | | | | | | | |
| 1961----- | 5-5 | 75 | 17,770 | 5.95 | 104,200 | 9.13 | 161,300 | 0.33 | 5,700 |
| 1962----- | 5-5 | 75 | 20,610 | 4.93 | 101,900 | 6.92 | 138,100 | 0.34 | 6,700 |
| Percent change----- | | | +16 | -17 | -2 | -24 | -14 | +3 | +18 |
| Washington: | | | | | | | | | |
| 1961----- | 4-8 | 75 | 52,490 | 7.19 | 382,300 | 10.18 | 514,900 | 0.50 | 24,900 |
| 1962----- | 4-8 | 75 | 48,780 | 7.63 | 373,500 | 6.82 | 322,100 | 0.76 | 35,900 |
| Percent change----- | | | -7 | +6 | -2 | -33 | -37 | +52 | +44 |
| Flyway total----- | | | | | | | | | |
| 1961----- | | | 247,080 | 6.27 | 1,545,100 | 10.31 | 2,555,300 | 1.01 | 248,500 |
| 1962----- | | | 239,540 | 6.85 | 1,647,200 | 7.62 | 1,778,900 | 1.14 | 275,100 |
| Percent change----- | | | -3 | +9 | +7 | -26 | -30 | +13 | +11 |

¹ Colorado, Montana, New Mexico and Wyoming listed in Central Flyway, Table A-14.

² Indicates split season.

TABLE A-8.--Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in the CENTRAL FLYWAY during the 1961 and the 1962 hunting seasons

[Bag estimates adjusted for response bias]

| Species ¹ | 1961 | 1962 | Percent change |
|--|-----------|---------|----------------|
| Ducks: | | | |
| Dabblers: | | | |
| Mallard----- | 445,400 | 203,200 | -54 |
| Black duck----- | 2,000 | 500 | -75 |
| Black X Mallard----- | 300 | 100 | -67 |
| Mottled duck----- | 15,200 | 10,900 | -28 |
| Gadwall----- | 27,800 | 35,800 | +29 |
| American widgeon----- | 55,900 | 29,500 | -47 |
| Green-winged teal----- | 107,900 | 48,200 | -55 |
| Blue-winged and cinnamon teal----- | 9,400 | 8,500 | -10 |
| Shoveler----- | 24,400 | 16,400 | -33 |
| Pintail----- | 54,500 | 46,900 | -14 |
| Wood duck----- | 8,900 | 9,400 | +6 |
| Divers: | | | |
| Redhead----- | 3,400 | 1,100 | -68 |
| Canvasback----- | 400 | -- | -- |
| Greater scaup----- | 1,600 | 700 | -56 |
| Lesser scaup----- | 57,300 | 11,300 | -80 |
| Ring-necked duck----- | 14,200 | 11,500 | -19 |
| American goldeneye----- | 2,500 | 1,000 | -60 |
| Bufflehead----- | 3,000 | 2,000 | -33 |
| Ruddy duck----- | 2,100 | 1,300 | -38 |
| Miscellaneous: | | | |
| Scoter----- | 200 | Trace | -- |
| Common and red-breasted merganser----- | 300 | 200 | -33 |
| Hooded merganser----- | 700 | 500 | -29 |
| Other and unknown----- | 2,600 | 400 | -85 |
| Total: ² | | | |
| Retrieved----- | 839,900 | 439,200 | -48 |
| Not retrieved----- | 236,000 | 131,700 | -44 |
| Ducks killed----- | 1,075,900 | 570,900 | -47 |
| Coots: | | | |
| Retrieved----- | 13,600 | 10,100 | -26 |
| Not retrieved----- | 9,500 | 7,900 | -17 |
| Coots killed----- | 23,100 | 18,000 | -22 |

¹ Species composition derived from the 1961 and 1962 duck wing surveys.

² Duck totals estimated to nearest thousand.

TABLE A-9.--Total bags, by species, and crippling losses of geese in the CENTRAL FLYWAY during the 1961 and 1962 hunting seasons

[Bag estimates adjusted for response bias]

| Species ¹ | 1961 | 1962 | Percent change |
|---------------------------------|---------|---------|----------------|
| Geese: | | | |
| Canada goose ² ----- | 71,700 | 64,800 | (1) |
| Snow goose----- | 74,000 | 52,300 | (1) |
| Blue goose----- | 30,200 | 22,300 | (1) |
| White-fronted goose----- | 18,600 | 17,200 | (1) |
| Unknown----- | 11,900 | 100 | (1) |
| Totals: | | | |
| Retrieved----- | 206,400 | 156,700 | -24 |
| Not retrieved----- | 45,400 | 27,500 | -39 |
| Geese killed----- | 251,800 | 184,200 | -27 |

¹Percentage changes in species bag omitted: 1962 species estimates derived from the Bureau's goose tail survey, 1961 estimates from mail questionnaire reports.

²Includes Hutchins goose.

TABLE A-10.--Waterfowl hunting activity and bags of ducks and geese in the CENTRAL FLYWAY during the 1962 hunting season, with 1961 season comparisons

[Estimates unadjusted for response bias]

| Hunting season | Duck bag limit | Days in duck season | Total active hunters | Hunter-days | | Duck bag | | Goose bag | |
|-------------------|----------------|--------------------------|----------------------|-----------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
| | | | | Days per adult hunter | State total | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| Colorado: | | | | | | | | | |
| 1961----- | 3-6 | 30 | 21,670 | 4.83 | 102,500 | 3.63 | 73,200 | 0.45 | 9,400 |
| 1962----- | [2-4 4-8] | [25 75 ²] | 13,010 | 6.16 | 79,400 | 2.64 | 33,200 | 0.64 | 7,900 |
| Percent change--- | | | -40 | +28 | -23 | -27 | -55 | +42 | -16 |
| Kansas: | | | | | | | | | |
| 1961----- | 3-6 | 30 | 31,730 | 5.87 | 183,800 | 5.23 | 158,000 | 0.46 | 13,700 |
| 1962----- | 2-4 | 25 | 16,120 | 5.55 | 88,600 | 2.98 | 46,500 | 0.40 | 6,100 |
| Percent change--- | | | -49 | -5 | -52 | -43 | -71 | -13 | -55 |
| Montana: | | | | | | | | | |
| 1961----- | 3-6 | 30 | 17,810 | 5.23 | 94,500 | 7.32 | 131,900 | 0.53 | 8,900 |
| 1962----- | [2-4 5-5] | [25 75 ²] | 11,120 | 5.62 | 61,900 | 3.61 | 38,900 | 0.83 | 8,800 |
| Percent change--- | | | -38 | +7 | -34 | -51 | -71 | +57 | -1 |
| Nebraska: | | | | | | | | | |
| 1961----- | 2-4 | 40 | 27,650 | 6.65 | 180,500 | 5.61 | 147,900 | 0.91 | 23,300 |
| 1962----- | 2-4 | 25 | 14,190 | 7.88 | 110,800 | 3.50 | 48,000 | 0.87 | 11,700 |
| Percent change--- | | | -49 | +18 | -39 | -38 | -68 | -4 | -50 |
| New Mexico: | | | | | | | | | |
| 1961----- | 3-6 | 27 ¹ | 3,020 | 5.00 | 14,900 | 3.84 | 11,400 | 0.24 | 700 |
| 1962----- | [2-4 4-8] | [25 75 ²] | 1,670 | 4.98 | 8,200 | 3.68 | 6,000 | 0.30 | 500 |
| Percent change--- | | | -45 | -- | -45 | -4 | -47 | +25 | -29 |
| North Dakota: | | | | | | | | | |
| 1961----- | 3-6 | 30 | 22,280 | 5.45 | 120,700 | 4.50 | 98,400 | 1.52 | 32,400 |
| 1962----- | 2-4 | 25 | 22,850 | 6.43 | 145,500 | 4.95 | 109,300 | 0.86 | 18,700 |
| Percent change--- | | | +3 | +18 | +21 | +10 | +11 | -43 | -42 |
| Oklahoma: | | | | | | | | | |
| 1961----- | 3-6 | 30 | 16,840 | 5.56 | 92,400 | 5.04 | 81,800 | 0.39 | 6,400 |
| 1962----- | 2-4 | 25 | 11,110 | 5.37 | 59,000 | 2.61 | 28,000 | 0.61 | 6,400 |
| Percent change--- | | | -34 | -3 | -36 | -48 | -66 | +56 | -- |
| South Dakota: | | | | | | | | | |
| 1961----- | 2-4 | 40 | 27,740 | 7.45 | 209,800 | 4.72 | 132,500 | 2.29 | 61,800 |
| 1962----- | 2-4 | 25 | 24,200 | 6.79 | 162,700 | 3.07 | 71,800 | 2.23 | 51,300 |
| Percent change--- | | | -13 | -9 | -22 | -35 | -46 | -3 | -17 |
| Texas: | | | | | | | | | |
| 1961----- | 3-6 | 30 | 53,320 | 5.01 | 262,600 | 5.52 | 277,900 | 1.54 | 79,100 |
| 1962----- | 2-4 | 25 | 43,680 | 6.09 | 263,300 | 4.59 | 193,900 | 1.63 | 67,700 |
| Percent change--- | | | -18 | +22 | -- | -17 | -30 | +6 | -14 |
| Wyoming: | | | | | | | | | |
| 1961----- | 2-4 | 40 | 4,390 | 5.76 | 24,900 | 5.49 | 23,400 | 0.49 | 2,100 |
| 1962----- | [2-4 4-8] | [25 75 ²] | 3,040 | 5.86 | 17,600 | 6.37 | 18,700 | 0.52 | 1,500 |
| Percent change--- | | | -31 | +2 | -29 | +16 | -20 | +6 | -29 |
| Flyway Total | | | | | | | | | |
| 1961----- | | | 226,450 | 5.71 | 1,286,600 | 5.02 | 1,136,500 | 1.11 | 237,700 |
| 1962----- | | | 161,000 | 6.27 | 997,000 | 3.78 | 594,300 | 1.17 | 180,500 |
| Percent change--- | | | -30 | +10 | -23 | -25 | -48 | +5 | -24 |

¹ Indicates a split season

² State's bag limit and season length west of Continental Divide (Pacific Flyway).

TABLE A-11.--Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in the MISSISSIPPI FLYWAY during the 1961 and the 1962 hunting seasons

[Bag estimates adjusted for response bias]

| Species ¹ | 1961 | 1962 | Percent change |
|--|-----------|-----------|----------------|
| Ducks: | | | |
| Dabblers: | | | |
| Mallard----- | 854,000 | 406,800 | -52 |
| Black duck----- | 62,100 | 43,200 | -30 |
| Black X Mallard----- | 4,000 | 2,500 | -38 |
| Mottled and Florida duck----- | 17,000 | 6,300 | -63 |
| Gadwall----- | 40,200 | 28,000 | -30 |
| American widgeon----- | 99,200 | 49,300 | -50 |
| Green-winged teal----- | 141,200 | 63,100 | -55 |
| Blue-winged teal----- | 42,100 | 44,100 | + 5 |
| Shoveler----- | 17,800 | 13,200 | -26 |
| Pintail----- | 80,200 | 47,800 | -40 |
| Wood duck----- | 108,000 | 150,500 | +39 |
| Divers: | | | |
| Redhead----- | 1,800 | 2,000 | +11 |
| Canvasback----- | 300 | 100 | -67 |
| Greater scaup----- | 9,200 | 11,100 | +21 |
| Lesser scaup----- | 154,100 | 43,600 | -72 |
| Ring-necked duck----- | 79,600 | 80,900 | + 2 |
| Goldeneye----- | 6,000 | 6,000 | -- |
| Bufflehead----- | 14,000 | 10,800 | -23 |
| Ruddy duck----- | 4,100 | 5,300 | +29 |
| Miscellaneous: | | | |
| Scoter----- | 500 | 400 | -20 |
| Old squaw and eider----- | 1,300 | 100 | -92 |
| Common and red-breasted merganser----- | 1,000 | 700 | -30 |
| Hooded merganser----- | 8,100 | 6,100 | -25 |
| Other and unknown----- | 3,300 | 2,100 | -36 |
| Total ² | | | |
| Retrieved----- | 1,746,200 | 1,024,900 | -41 |
| Not retrieved----- | 568,500 | 318,100 | -44 |
| Ducks killed----- | 2,314,700 | 1,343,000 | -42 |
| Coots: | | | |
| Retrieved----- | 72,600 | 80,600 | +11 |
| Not retrieved----- | 34,400 | 24,500 | -29 |
| Coots killed----- | 107,000 | 105,100 | - 2 |

¹ Species composition derived from the 1961 and 1962 duck wing surveys.

² Duck totals estimated to nearest thousand.

TABLE A-12.--Total bags, by species, and crippling losses of geese in the MISSISSIPPI FLYWAY during the 1961 and 1962 hunting seasons

[Bag estimates adjusted for response bias]

| Species ¹ | 1961 | 1962 | Percent change |
|---------------------------------|---------|---------|----------------|
| Geese: | | | |
| Canada goose ² ----- | 106,900 | 79,600 | (1) |
| Snow goose----- | 26,000 | 9,400 | (1) |
| Blue goose----- | 32,200 | 35,500 | (1) |
| White-fronted goose----- | 6,000 | 4,700 | (1) |
| Unknown----- | 400 | 1,000 | (1) |
| Totals: | | | |
| Retrieved----- | 171,500 | 130,200 | -24 |
| Not retrieved----- | 42,500 | 27,400 | -36 |
| Geese killed----- | 214,000 | 157,600 | -26 |

¹ Percentage changes in species bag omitted: 1962 species estimates derived from the Bureau's goose tail survey, 1961 estimates from mail questionnaire reports.

² Includes Hutchins goose.

TABLE A-13.--Waterfowl hunting activity and bags of ducks and geese in the MISSISSIPPI FLYWAY during the 1962 hunting season, with 1961 season comparisons

[Estimates unadjusted for response bias]

| Hunting season | Duck bag limit | Days in duck season | Total active hunters | Hunter-days | | Duck bag | | Goose bag | |
|------------------|----------------|---------------------|----------------------|-----------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
| | | | | Days per adult hunter | State total | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| Alabama: | | | | | | | | | |
| 1961----- | 3-6 | 20 | 4,840 | 4.60 | 22,200 | 4.18 | 19,400 | 0.22 | 900 |
| 1962----- | 2-4 | 25 | 5,490 | 6.89 | 37,500 | 5.72 | 30,400 | 0.64 | 3,400 |
| Percent change-- | | | +13 | +50 | +69 | +37 | +57 | +191 | +278 |
| Arkansas: | | | | | | | | | |
| 1961----- | 2-4 | 30 | 16,860 | 5.78 | 93,900 | 5.34 | 85,600 | 0.14 | 2,200 |
| 1962----- | 2-4 | 25 | 8,620 | 7.30 | 62,300 | 8.31 | 69,400 | 0.06 | 500 |
| Percent change | | | -49 | +26 | -34 | +56 | -19 | -57 | -77 |
| Illinois: | | | | | | | | | |
| 1961----- | 2-4 | 30 | 55,640 | 6.74 | 371,900 | 4.87 | 264,700 | 0.75 | 41,100 |
| 1962----- | 2-4 | 25 | 37,230 | 6.00 | 221,300 | 2.74 | 98,700 | 0.41 | 14,600 |
| Percent change-- | | | -33 | -11 | -40 | -44 | -63 | -45 | -64 |
| Indiana: | | | | | | | | | |
| 1961----- | 2-4 | 27 ¹ | 16,300 | 5.71 | 90,600 | 1.96 | 30,400 | 0.29 | 4,400 |
| 1962----- | 2-4 | 25 | 12,860 | 5.05 | 64,400 | 1.62 | 20,200 | 0.26 | 3,200 |
| Percent change-- | | | -21 | -12 | -29 | -17 | -34 | -10 | -27 |
| Iowa: | | | | | | | | | |
| 1961----- | 2-4 | 30 | 36,560 | 6.83 | 246,500 | 4.99 | 175,000 | 0.50 | 17,500 |
| 1962----- | 2-4 | 25 | 26,080 | 6.50 | 167,900 | 2.89 | 73,100 | 0.67 | 16,800 |
| Percent change-- | | | -29 | -5 | -32 | -42 | -58 | +34 | -4 |
| Kentucky: | | | | | | | | | |
| 1961----- | 2-4 | 30 | 5,530 | 6.66 | 36,600 | 4.12 | 22,300 | 0.41 | 2,200 |
| 1962----- | 2-4 | 25 | 4,030 | 4.93 | 19,700 | 2.56 | 10,000 | 0.25 | 1,000 |
| Percent change-- | | | -27 | -26 | -46 | -38 | -55 | -39 | -55 |
| Louisiana: | | | | | | | | | |
| 1961----- | 3-6 | 20 | 37,490 | 5.59 | 204,700 | 8.05 | 288,300 | 0.85 | 30,100 |
| 1962----- | 2-4 | 25 | 31,060 | 6.17 | 189,900 | 6.29 | 189,400 | 0.96 | 28,400 |
| Percent change-- | | | -17 | +10 | -7 | -22 | -34 | +13 | -6 |
| Michigan: | | | | | | | | | |
| 1961----- | 2-4 | 30 | 54,810 | 5.27 | 288,000 | 3.08 | 161,800 | 0.23 | 12,100 |
| 1962----- | 2-4 | 25 | 41,960 | 5.30 | 220,300 | 3.22 | 131,000 | 0.33 | 13,300 |
| Percent change-- | | | -23 | +1 | -24 | +5 | -19 | +43 | +10 |
| Minnesota: | | | | | | | | | |
| 1961----- | 2-4 | 30 | 82,760 | 3.00 | 263,700 | 6.08 | 487,116 | 0.38 | 29,700 |
| 1962----- | 2-4 | 25 | 72,140 | 5.82 | 416,100 | 4.69 | 328,100 | 0.24 | 16,600 |
| Percent change-- | | | -13 | +94 | +58 | -23 | -33 | -37 | -44 |
| Mississippi: | | | | | | | | | |
| 1961----- | 2-4 | 30 | 5,570 | 5.02 | 28,100 | 4.85 | 26,200 | 0.29 | 100 |
| 1962----- | 2-4 | 25 | 6,410 | 6.37 | 40,500 | 7.42 | 46,100 | 0.07 | 400 |
| Percent change-- | | | +15 | +27 | +44 | +53 | +76 | -76 | +300 |
| Missouri: | | | | | | | | | |
| 1961----- | 2-4 | 30 | 34,600 | 5.81 | 197,300 | 4.88 | 165,100 | 0.92 | 30,400 |
| 1962----- | 2-4 | 25 | 23,090 | 5.00 | 114,300 | 1.53 | 34,300 | 1.35 | 29,800 |
| Percent change-- | | | -33 | -14 | -42 | -69 | -79 | +47 | -2 |
| Ohio: | | | | | | | | | |
| 1961----- | 2-4 | 30 | 22,040 | 5.90 | 128,600 | 3.02 | 65,300 | 0.09 | 2,100 |
| 1962----- | 2-4 | 25 | 17,900 | 5.75 | 102,000 | 2.99 | 51,800 | 0.14 | 2,400 |
| Percent change-- | | | -19 | -3 | -21 | -1 | -21 | +56 | +14 |
| Tennessee: | | | | | | | | | |
| 1961----- | 2-4 | 30 | 13,960 | 6.15 | 83,300 | 4.78 | 64,400 | 0.18 | 2,400 |
| 1962----- | 2-4 | 25 | 7,270 | 5.92 | 42,600 | 3.08 | 21,700 | 0.34 | 2,400 |
| Percent change-- | | | -48 | -4 | -49 | -36 | -66 | +89 | -- |
| Wisconsin: | | | | | | | | | |
| 1961----- | 2-4 | 30 | 79,750 | 8.84 | 537,100 | 5.10 | 392,900 | 0.35 | 26,900 |
| 1962----- | 2-4 | 25 | 63,520 | 6.14 | 386,200 | 3.50 | 215,600 | 0.34 | 20,800 |
| Percent change-- | | | -20 | -10 | -28 | -31 | -45 | -9 | -23 |
| Flyway total: | | | | | | | | | |
| 1961----- | | | 466,700 | 5.51 | 2,592,600 | 4.87 | 2,248,600 | 0.45 | 202,300 |
| 1962----- | | | 357,640 | 5.89 | 2,084,800 | 3.82 | 1,319,800 | 0.45 | 153,600 |
| Percent change-- | | | -23 | +7 | -20 | -22 | -41 | -- | -24 |

¹ Indicates split season.

TABLE A-14.--Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in the ATLANTIC FLYWAY during the 1961 and the 1962 hunting seasons

[Bag estimates adjusted for response bias]

| Species ¹ | 1961 | 1962 | Percent change |
|--|---------|---------|----------------|
| Ducks: | | | |
| Dabblers: | | | |
| Mallard----- | 108,100 | 119,400 | +10 |
| Black duck----- | 201,100 | 223,100 | +11 |
| Black X Mallard----- | 7,300 | 6,700 | -8 |
| Mottled and Florida duck----- | 26,200 | 14,300 | -45 |
| Gadwall----- | 3,400 | 6,200 | +82 |
| American widgeon----- | 29,300 | 28,400 | -3 |
| Green-winged teal----- | 50,600 | 45,000 | -11 |
| Blue-winged teal----- | 14,200 | 10,800 | -24 |
| Shoveler----- | 3,200 | 3,600 | +13 |
| Pintail----- | 17,300 | 17,200 | -1 |
| Wood duck----- | 126,600 | 119,500 | -6 |
| Divers: | | | |
| Redhead----- | 800 | 400 | -50 |
| Canvasback----- | 200 | 200 | -- |
| Greater scaup----- | 16,100 | 33,300 | +107 |
| Lesser scaup----- | 29,900 | 15,700 | -47 |
| Ring-necked duck----- | 51,700 | 48,100 | -7 |
| Goldeneye----- | 14,000 | 15,100 | +8 |
| Bufflehead----- | 12,400 | 14,800 | +19 |
| Ruddy duck----- | 2,300 | 3,700 | +61 |
| Miscellaneous: | | | |
| Scoter----- | 14,600 | 12,800 | -12 |
| Old squaw and eider----- | 900 | 4,500 | +400 |
| Common and red-breasted merganser----- | 700 | 6,300 | +800 |
| Hooded merganser----- | 8,900 | 12,100 | +36 |
| Others and unknown----- | 3,300 | 1,900 | -42 |
| Total:² | | | |
| Retrieved----- | 743,700 | 764,300 | +3 |
| Not retrieved----- | 228,100 | 191,200 | -16 |
| Ducks killed----- | 971,800 | 955,500 | -2 |
| Coots: | | | |
| Retrieved----- | 28,400 | 37,900 | +33 |
| Not retrieved----- | 14,700 | 11,100 | -24 |
| Coots killed----- | 43,100 | 49,000 | +14 |

¹ Species composition derived from the 1961 and 1962 duck wing surveys.

² Duck totals estimated to nearest thousand.

TABLE A-15.--Total bags, by species, and crippling losses of geese in the ATLANTIC FLYWAY during the 1961 and 1962 hunting seasons

[Bag estimates adjusted for response bias]

| Species ¹ | 1961 | 1962 | Percent change |
|-------------------------|---------|---------|------------------|
| Geese: | | | |
| Canada goose----- | 64,900 | 88,400 | (¹) |
| American brant----- | 17,800 | 19,700 | (¹) |
| Others and unknown----- | 3,100 | 600 | (¹) |
| Totals: | | | |
| Retrieved----- | 85,800 | 108,700 | +27 |
| Not retrieved----- | 18,300 | 16,000 | -13 |
| Geese killed----- | 104,100 | 124,700 | +20 |

¹ Percentage changes in species bag omitted: 1962 species estimates derived from the Bureau's goose tall survey, 1961 estimates from mail questionnaire reports.

TABLE A-16.--Waterfowl hunting activity and bags of ducks and geese in the ATLANTIC FLYWAY during the 1962 hunting season, with 1961 season comparisons

[Estimates unadjusted for response bias]

| Hunting season | Duck bag limit | Days in duck season | Total active hunters | Hunter-days | | Duck bag | | Goose bag | |
|-------------------|----------------|----------------------|----------------------|------------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
| | | | | Days per adult hunters | State total | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| Connecticut: | | | | | | | | | |
| 1961----- | 2-4 | 50 | 5,230 | 6.12 | 31,500 | 3.36 | 16,800 | 0.06 | 300 |
| 1962----- | 2-4 | 45 ¹ | 5,680 | 6.90 | 39,000 | 6.29 | 35,000 | 0.20 | 1,000 |
| Percent change--- | | | +9 | +13 | +24 | +87 | +108 | +233 | +233 |
| Delaware: | | | | | | | | | |
| 1961----- | 3-6 | 40 | 5,580 | 8.38 | 46,100 | 5.58 | 30,600 | 1.70 | 9,200 |
| 1962----- | 2-4 | 48 | 4,750 | 7.86 | 37,100 | 4.97 | 23,100 | 1.02 | 4,700 |
| Percent change--- | | | -15 | -6 | -20 | -11 | -25 | -40 | -49 |
| Florida: | | | | | | | | | |
| 1961----- | 3-6 | 40 | 19,240 | 5.42 | 104,500 | 7.50 | 140,400 | 0.07 | 1,200 |
| 1962----- | 3-6 | 40 | 15,910 | 5.90 | 93,400 | 7.15 | 111,500 | 0.05 | 800 |
| Percent change--- | | | -17 | +9 | -11 | -5 | -21 | -29 | -33 |
| Georgia: | | | | | | | | | |
| 1961----- | 2-4 | 50 | 5,710 | 4.64 | 25,900 | 4.26 | 22,800 | 0.11 | 600 |
| 1962----- | 3-6 | 40 | 4,660 | 5.57 | 25,800 | 6.45 | 29,400 | 0.06 | 300 |
| Percent change--- | | | -18 | +20 | -- | +51 | +29 | -45 | -50 |
| Maine: | | | | | | | | | |
| 1961----- | 2-4 | 45 ¹ | 5,980 | 5.09 | 30,100 | 7.33 | 41,300 | 0.09 | 500 |
| 1962----- | 2-4 | 45 ¹ | 6,810 | 6.01 | 40,700 | 5.82 | 38,800 | 0.07 | 400 |
| Percent change--- | | | +14 | +18 | +35 | -21 | -6 | -22 | -20 |
| Maryland: | | | | | | | | | |
| 1961----- | 2-4 | 50 | 15,370 | 6.36 | 95,800 | 3.87 | 55,100 | 2.40 | 34,100 |
| 1962----- | 2-4 | 50 | 15,740 | 7.39 | 112,600 | 4.53 | 67,800 | 3.35 | 49,800 |
| Percent change--- | | | +2 | +16 | +18 | +17 | +23 | +40 | +46 |
| Massachusetts: | | | | | | | | | |
| 1961----- | 2-4 | 45 ¹ | 13,320 | 7.08 | 96,300 | 5.04 | 65,800 | 0.13 | 1,700 |
| 1962----- | 2-4 | 45 ¹ | 12,940 | 6.39 | 82,200 | 3.93 | 49,800 | 0.23 | 3,000 |
| Percent change--- | | | -3 | -10 | -15 | -22 | -24 | +77 | +76 |
| New Hampshire: | | | | | | | | | |
| 1961----- | 2-4 | 50 | 3,890 | 8.04 | 30,500 | 4.00 | 14,900 | 0.06 | 200 |
| 1962----- | 3-6 | 36 ¹ | 3,400 | 5.68 | 19,200 | 3.14 | 10,400 | 0.04 | 100 |
| Percent change--- | | | -13 | -29 | -37 | -22 | -30 | -33 | -50 |
| New Jersey: | | | | | | | | | |
| 1961----- | 3-6 | 40 | 12,110 | 6.01 | 72,500 | 3.77 | 44,400 | 1.57 | 18,700 |
| 1962----- | 2-4 | 50 | 15,870 | 6.99 | 110,300 | 5.87 | 91,200 | 1.56 | 24,000 |
| Percent change--- | | | +31 | +16 | +52 | +56 | +105 | -1 | +28 |
| New York: | | | | | | | | | |
| 1961----- | 3-6 | 36 ¹ (LI) | 38,520 | 6.25 | 241,400 | 5.14 | 197,300 | 0.28 | 10,700 |
| 1962----- | 2-4 | 40 | 36,330 | 6.02 | 217,500 | 4.22 | 150,100 | 0.18 | 6,200 |
| Percent change--- | | 45 ¹ | -6 | -4 | -10 | -18 | -24 | -36 | -42 |
| North Carolina: | | | | | | | | | |
| 1961----- | 3-6 | 40 | 15,570 | 5.11 | 77,800 | 3.62 | 54,000 | 0.97 | 13,800 |
| 1962----- | 2-4 | 50 | 17,380 | 5.14 | 88,700 | 3.34 | 56,800 | 1.67 | 28,100 |
| Percent change--- | | | +12 | +1 | +14 | -8 | +5 | +72 | +104 |

¹Indicates split season.

TABLE A-16.--Waterfowl hunting activity and bags of ducks and geese in the ATLANTIC FLYWAY during the 1962 hunting season, with 1961 season comparisons--Continued.

[Estimates unadjusted for response bias]

| Hunting season | Duck bag limit | Days in duck season | Total adult hunters | Hunter-days | | Duck bag | | Goose bag | |
|-------------------|----------------|---------------------|---------------------|------------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
| | | | | Days per adult hunters | State total | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| Pennsylvania: | | | | | | | | | |
| 1961----- | 2-4 | 50 | 21,360 | 5.39 | 114,100 | 2.71 | 56,500 | 0.35 | 7,200 |
| 1962----- | 2-4 | 50 | 24,550 | 4.93 | 120,400 | 2.78 | 66,800 | 0.17 | 4,000 |
| Percent change--- | | | -15 | -9 | +6 | +3 | +18 | -51 | -44 |
| Rhode Island: | | | | | | | | | |
| 1961----- | 3-6 | 40 | 1,720 | 8.44 | 14,700 | 5.14 | 8,900 | 0.07 | 200 |
| 1962----- | 2-4 | 50 | 1,450 | 8.02 | 11,600 | 5.01 | 7,100 | 0.08 | 100 |
| Percent change--- | | | -16 | -5 | -21 | -3 | -20 | +14 | +50 |
| South Carolina: | | | | | | | | | |
| 1961----- | 3-6 | 40 | 9,160 | 5.49 | 49,200 | 4.93 | 43,900 | 0.08 | 600 |
| 1962----- | 3-6 | 40 | 9,330 | 6.74 | 62,500 | 6.75 | 61,800 | 0.11 | 1,000 |
| Percent change--- | | | +2 | +23 | +27 | +37 | +41 | +38 | +67 |
| Vermont: | | | | | | | | | |
| 1961----- | 3-6 | 40 | 3,040 | 6.47 | 19,600 | 5.50 | 16,500 | 0.15 | 500 |
| 1962----- | 3-6 | 40 | 3,110 | 6.76 | 20,900 | 7.76 | 23,600 | 0.03 | 100 |
| Percent change--- | | | +2 | +4 | +7 | +41 | +43 | -80 | -80 |
| Virginia: | | | | | | | | | |
| 1961----- | 3-6 | 40 | 9,300 | 5.30 | 49,000 | 4.38 | 39,600 | 0.80 | 7,100 |
| 1962----- | 2-4 | 50 | 10,830 | 5.63 | 59,800 | 4.98 | 51,600 | 1.01 | 10,900 |
| Percent change--- | | | +16 | +6 | +22 | +14 | +30 | +26 | +54 |
| West Virginia: | | | | | | | | | |
| 1961----- | 3-6 | 36 ¹ | 1,000 | 5.49 | 5,400 | 2.44 | 2,400 | 0.09 | 100 |
| 1962----- | 2-4 | 45 ¹ | 1,210 | 6.08 | 7,300 | 3.77 | 4,500 | 0.43 | 500 |
| Percent change--- | | | +21 | +11 | +35 | +55 | +88 | +378 | +400 |
| Flyway total | | | | | | | | | |
| 1961----- | | | 186,090 | 5.94 | 1,104,300 | 4.61 | 850,900 | 0.61 | 106,700 |
| 1962----- | | | 189,940 | 6.06 | 1,148,900 | 4.72 | 879,200 | 0.74 | 135,100 |
| Percent change--- | | | +2 | +2 | +4 | +2 | +3 | +21 | +27 |

¹Indicates split season.

B. WING COLLECTION SURVEY

TABLE B-1.-- Hunters contacted and wings received in wing collections,
hunting seasons, 1960-1962

| Flyway | Number of-- | | | Number of-- | | |
|------------------|-------------------|--------|--------|----------------|--------|--------|
| | Hunters contacted | | | Wings received | | |
| | 1960 | 1961 | 1962 | 1960 | 1961 | 1962 |
| Pacific----- | -- | 4,967 | 5,259 | -- | 11,247 | 16,219 |
| Central----- | -- | 6,785 | 8,066 | -- | 8,712 | 10,494 |
| Mississippi----- | 10,316 | 12,329 | 15,916 | 23,019 | 13,781 | 23,319 |
| Atlantic----- | 8,599 | 7,770 | 8,860 | 13,306 | 9,504 | 16,543 |

TABLE B-2.-- Age ratios of ducks obtained from the wing collection survey, flywaywide, 1961-62¹

| Species | Number of-- | | | | | | | | Immatures per adult | | | | | | | | | |
|------------------------------|----------------|------|----------------|------|--------------------|------|-----------------|------|---------------------|------|----------------|--------|--------------------|------|-----------------|------|---------------|---------------|
| | Wings received | | | | | | | | | | | | | | | | | |
| | Pacific Flyway | | Central Flyway | | Mississippi Flyway | | Atlantic Flyway | | Pacific Flyway | | Central Flyway | | Mississippi Flyway | | Atlantic Flyway | | United States | United States |
| | 1961 | 1962 | 1961 | 1962 | 1961 | 1962 | 1961 | 1962 | 1961 | 1962 | 1961 | 1962 | 1961 | 1962 | 1961 | 1962 | 1961 | 1962 |
| Mallard----- | 3692 | 5686 | 4909 | 5086 | 6348 | 9032 | 1224 | 2466 | 1.22 | 1.25 | 0.69 | 0.94 | 1.08 | 1.40 | 1.97 | 1.53 | 1.05 | 1.26 |
| Black duck----- | -- | -- | -- | -- | 693 | 1150 | 2947 | 5530 | -- | -- | -- | (1.97) | 2.04 | 1.49 | 1.75 | 1.32 | 1.82 | 1.35 |
| Gadwall----- | 249 | 527 | 245 | 800 | 321 | 650 | 34 | 98 | 1.23 | 2.19 | 1.06 | 2.75 | 1.04 | 1.78 | 1.36 | 1.65 | 1.12 | 2.19 |
| American widgeon----- | 1853 | 2021 | 512 | 712 | 680 | 1187 | 305 | 566 | 1.44 | 1.29 | 3.41 | 1.60 | 3.29 | 2.20 | 1.04 | 0.79 | 1.81 | 1.37 |
| Green-winged teal | 1075 | 2026 | 874 | 1154 | 815 | 1375 | 641 | 1004 | 0.90 | 0.95 | 2.69 | 1.91 | 2.66 | 2.34 | 1.74 | 1.18 | 1.55 | 1.27 |
| Cinnamon blue-winged teal--- | 207 | 498 | 101 | 179 | 254 | 1022 | 149 | 209 | 1.87 | 1.12 | 3.64 | 2.11 | 1.69 | 1.65 | 1.58 | 1.47 | 1.83 | 1.40 |
| Shoveler----- | 735 | 991 | 172 | 373 | 114 | 278 | 25 | 56 | 1.29 | 1.82 | 2.62 | 1.89 | 7.65 | 3.33 | 1.04 | 8.07 | 1.60 | 2.01 |
| Pintail----- | 1848 | 3175 | 445 | 1037 | 571 | 1103 | 219 | 349 | 0.59 | 1.09 | 1.25 | 1.09 | 1.52 | 1.30 | 1.05 | 0.85 | 0.76 | 1.10 |
| Wood duck----- | 77 | 79 | 48 | 209 | 820 | 3473 | 1400 | 2167 | 2.43 | 1.46 | 0.77 | 1.10 | 2.11 | 1.25 | 1.66 | 1.29 | 1.83 | 1.28 |
| Greater scaup--- | 31 | 242 | 9 | 14 | 88 | 265 | 206 | 683 | 1.81 | 2.89 | (0.82) | (1.13) | 1.47 | 3.97 | 0.79 | 1.05 | 1.12 | 1.79 |
| Lesser scaup--- | 118 | 147 | 402 | 257 | 989 | 956 | 260 | 316 | 4.20 | 1.84 | 2.87 | 1.53 | 1.83 | 1.42 | 2.38 | 1.06 | 2.19 | 1.42 |
| Ring-necked duck----- | 62 | 73 | 85 | 252 | 527 | 1755 | 353 | 787 | 1.78 | 2.10 | 1.70 | 1.43 | 3.77 | 1.60 | 1.23 | 0.96 | 2.30 | 1.36 |
| Goldeneye----- | 88 | 119 | 35 | 30 | 44 | 129 | 201 | 374 | 0.83 | 3.45 | 6.51 | 1.30 | 1.94 | 1.91 | 0.83 | 0.89 | 1.87 | 1.55 |

NOTE: It was not possible to separate blue-winged from cinnamon teal.

¹ Ratios based on sample size of less than 20 are in parentheses.

TABLE B-3.--Age ratios of mallard determined from wing collections, hunting seasons, 1959-60, 1960-61, 1961-62, and 1962-63

| Location of kill | Number of-- | | | |
|-------------------------------|----------------|---------|---------------------|---------|
| | Wings received | | Immatures per adult | |
| | 1961-62 | 1962-63 | 1961-62 | 1962-63 |
| Pacific Flyway: | | | | |
| Washington----- | 1,259 | 1,739 | 1.1 | 1.0 |
| Oregon----- | 656 | 577 | 1.8 | 1.5 |
| Idaho----- | 715 | 1,328 | 0.9 | 1.0 |
| California----- | 679 | 734 | 1.5 | 1.8 |
| Nevada----- | 149 | 178 | 1.7 | 2.0 |
| Utah----- | 217 | 708 | 2.0 | 1.9 |
| Arizona----- | 17 | 59 | -- | 2.1 |
| Flyway weighted ratio ----- | -- | -- | 1.22 | 1.25 |
| Central Flyway: | | | | |
| Montana ¹ (E)----- | 599 | 165 | 1.2 | 2.1 |
| (W)----- | 482 | 571 | 1.2 | 1.2 |
| North Dakota----- | 531 | 988 | 1.1 | 1.2 |
| South Dakota----- | 145 | 493 | 0.5 | 1.0 |
| Wyoming (E)----- | 57 | 70 | 1.4 | 1.5 |
| (W)----- | 12 | 352 | -- | 1.1 |
| Nebraska----- | 1,210 | 205 | 0.5 | 0.5 |
| Colorado (E)----- | 840 | 403 | 0.4 | 0.7 |
| (W)----- | 101 | 249 | 0.3 | 0.8 |
| Kansas----- | 509 | 315 | 0.6 | 1.0 |
| New Mexico----- | 140 | 98 | 0.8 | 0.8 |
| Oklahoma----- | 129 | 204 | 0.7 | 0.6 |
| Texas----- | 139 | 620 | 0.6 | 0.8 |
| Flyway weighted ratio ----- | -- | -- | 0.69 | 0.94 |

See footnote at end of table.

TABLE B-3.--Age ratios of mallard determined from wing collections, hunting seasons, 1959-60, 1960-61, 1961-62, and 1962-63--continued

| Location of kill | Number of-- | | | | | | | |
|--|----------------|---------|---------|---------|---------------------|---------|-----------------|---------|
| | Wings received | | | | Immatures per adult | | | |
| | 1959-60 | 1960-61 | 1961-62 | 1962-63 | 1959-60 | 1960-61 | 1961-62 | 1962-63 |
| Mississippi Flyway: | | | | | | | | |
| Minnesota----- | 1,102 | 1,044 | 768 | 1,722 | 1.2 | 3.0 | 1.5 | 2.2 |
| Wisconsin----- | 344 | 1,021 | 772 | 1,798 | 2.1 | 3.3 | 2.0 | 2.7 |
| Michigan----- | 153 | 427 | 450 | 706 | 2.6 | 4.1 | 3.0 | 3.2 |
| Iowa----- | 182 | 536 | 560 | 329 | 0.5 | 1.8 | 1.0 | 1.6 |
| Illinois----- | 817 | 1,249 | 1,007 | 549 | 0.6 | 1.3 | 0.8 | 1.0 |
| Indiana----- | 32 | 524 | 210 | 178 | 1.5 | 0.9 | 0.8 | 1.1 |
| Ohio----- | 130 | 354 | 197 | 267 | 1.6 | 2.7 | 2.5 | 2.2 |
| Missouri----- | 539 | 1,301 | 597 | 331 | 0.5 | 1.3 | 1.0 | 0.8 |
| Kentucky----- | 11 | 574 | 373 | 202 | -- | 0.8 | 0.7 | 0.8 |
| Arkansas----- | 901 | 2,787 | 512 | 896 | 0.5 | 1.3 | 0.5 | 0.7 |
| Tennessee----- | 182 | 1,181 | 503 | 224 | 0.5 | 1.1 | 0.6 | 0.8 |
| Louisiana----- | 140 | 719 | 216 | 830 | 0.6 | 1.3 | 0.3 | 0.7 |
| Mississippi----- | 42 | 479 | 135 | 204 | 0.6 | 0.9 | 0.6 | 0.8 |
| Alabama----- | 17 | 274 | 48 | 188 | -- | 2.9 | 0.7 | 0.6 |
| Flyway weighted ratio ³ ----- | -- | -- | -- | -- | 0.77 | 1.76 | 1.08 | 1.40 |
| Atlantic Flyway: | | | | | | | | |
| Maine----- | -- | 34 | 10 | 25 | -- | 4.7 | -- ² | 7.3 |
| New Hampshire----- | -- | 10 | 11 | 7 | -- | -- | -- | -- |
| Vermont----- | -- | 55 | 44 | 42 | -- | 5.9 | 3.0 | 3.2 |
| Massachusetts----- | -- | 96 | 42 | 92 | -- | 2.6 | 3.2 | 1.7 |
| Rhode Island----- | -- | 9 | 22 | 27 | -- | -- | 3.4 | 0.6 |
| Connecticut----- | -- | 52 | 65 | 102 | -- | 4.2 | 4.0 | 2.2 |
| New York----- | -- | 280 | 343 | 337 | -- | 5.0 | 3.8 | 2.1 |
| Pennsylvania----- | -- | 190 | 124 | 481 | -- | 4.1 | 2.9 | 2.1 |
| West Virginia----- | -- | 36 | 20 | 50 | -- | 1.1 | 1.2 | 1.8 |
| New Jersey----- | -- | 215 | 147 | 306 | -- | 2.2 | 1.3 | 1.6 |
| Delaware----- | -- | 58 | 54 | 104 | -- | 1.4 | 1.1 | 1.0 |
| Maryland----- | -- | 172 | 66 | 311 | -- | 1.6 | 1.4 | 1.2 |
| Virginia----- | -- | 117 | 105 | 174 | -- | 1.8 | 0.8 | 1.0 |
| North Carolina----- | -- | 148 | 48 | 101 | -- | 1.3 | 0.9 | 0.9 |
| South Carolina----- | -- | 108 | 101 | 98 | -- | 1.4 | 0.6 | 1.3 |
| Georgia----- | -- | 6 | 1 | 28 | -- | -- | -- | 1.0 |
| Florida----- | -- | 24 | 21 | 33 | -- | 2.4 | 2.5 | 1.2 |
| Flyway weighted ratio ³ ----- | -- | -- | -- | -- | -- | 2.46 | 1.95 | 1.53 |
| Continental United States weighted ratio ³ -- | -- | -- | -- | -- | -- | -- | 1.05 | 0.94 |

NOTE: Wing surveys were conducted in the Mississippi Flyway in 1959-60, in the Mississippi and Atlantic Flyways in 1960-61, and in all flyways in 1961-62 and 1962-63.

¹ E-East, W-west of the Continental Divide.

² Ratio not shown if based on less than 20 wings.

³ In estimating flyway and U.S. ratios, the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

TABLE B-4.--Age ratios of black duck determined from wing collections, during hunting seasons 1959-60, 1960-61, 1961-62, and 1962-63

| Location of kill | Number of-- | | | | | | | |
|---|----------------|---------|---------|---------|---------------------|-----------------|---------|---------|
| | Wings received | | | | Immatures per adult | | | |
| | 1959-60 | 1960-61 | 1961-62 | 1962-63 | 1959-60 | 1960-61 | 1961-62 | 1962-63 |
| Mississippi Flyway: | | | | | | | | |
| Minnesota----- | 99 | 50 | 8 | 44 | 3.3 | 2.3 | -- | 3.0 |
| Wisconsin----- | 77 | 114 | 89 | 220 | 3.0 | 3.4 | 3.5 | 1.7 |
| Michigan----- | 109 | 216 | 200 | 338 | 2.1 | 2.0 | 2.5 | 1.6 |
| Iowa----- | 3 | 8 | 3 | 5 | -- | -- | -- | -- |
| Illinois----- | 44 | 30 | 52 | 48 | 1.8 | 2.0 | 1.4 | 1.5 |
| Indiana----- | 6 | 141 | 55 | 57 | -- | 1.2 | 1.1 | 1.7 |
| Ohio----- | 52 | 207 | 62 | 110 | 2.1 | 1.2 | 1.5 | 1.3 |
| Missouri----- | 5 | 14 | 4 | 3 | -- | -- | -- | -- |
| Kentucky----- | 5 | 141 | 126 | 96 | -- | 1.1 | 1.0 | 1.1 |
| Arkansas----- | 11 | 27 | 8 | 3 | -- | 2.0 | -- | -- |
| Tennessee----- | 34 | 241 | 67 | 85 | 1.0 | 1.3 | 1.0 | 1.2 |
| Louisiana----- | 4 | 13 | 3 | 19 | -- | -- | -- | -- |
| Mississippi----- | 2 | 32 | 7 | 11 | -- | 2.6 | -- | -- |
| Alabama----- | 4 | 41 | 9 | 75 | -- | 1.9 | -- | 0.7 |
| Flyway weighted ratio ² ----- | -- | -- | -- | -- | 1.53 | 1.83 | 2.04 | 1.49 |
| Atlantic Flyway: | | | | | | | | |
| Maine----- | -- | 878 | 379 | 564 | -- | 3.0 | 1.8 | 1.7 |
| Vermont----- | -- | 233 | 186 | 232 | -- | 5.5 | 3.8 | 3.5 |
| New Hampshire----- | -- | 71 | 72 | 193 | -- | 4.9 | 3.5 | 2.8 |
| Massachusetts----- | -- | 636 | 329 | 566 | -- | 2.2 | 1.8 | 1.6 |
| Connecticut----- | -- | 183 | 122 | 294 | -- | 2.4 | 2.1 | 1.6 |
| Rhode Island----- | -- | 159 | 93 | 204 | -- | 1.9 | 1.0 | 1.1 |
| New York----- | -- | 435 | 418 | 524 | -- | 2.7 | 2.3 | 1.6 |
| Pennsylvania----- | -- | 163 | 73 | 277 | -- | 3.0 | 0.6 | 1.2 |
| West Virginia----- | -- | 66 | 26 | 65 | -- | 0.6 | 0.9 | 0.4 |
| New Jersey----- | -- | 1,132 | 712 | 1,152 | -- | 1.9 | 1.6 | 1.0 |
| Delaware----- | -- | 200 | 122 | 259 | -- | 1.2 | 2.0 | 1.6 |
| Maryland----- | -- | 378 | 131 | 557 | -- | 1.4 | 2.2 | 1.0 |
| Virginia----- | -- | 161 | 148 | 247 | -- | 1.6 | 1.1 | 1.0 |
| North Carolina----- | -- | 228 | 59 | 93 | -- | 1.5 | 1.7 | 1.0 |
| South Carolina----- | -- | 46 | 53 | 54 | -- | 1.6 | 1.0 | 1.1 |
| Georgia----- | -- | 2 | -- | 8 | -- | -- ¹ | -- | -- |
| Florida----- | -- | 25 | 24 | 25 | -- | 4.0 | 3.0 | 2.1 |
| Flyway weighted ratio ² ----- | -- | -- | -- | -- | -- | 2.11 | 1.75 | 1.32 |
| Continental U. S. weighted ratio ² ----- | -- | -- | -- | -- | -- | 2.00 | 1.82 | 1.35 |

NOTE: Wing surveys were conducted in the Mississippi Flyway in 1959-60, in the Mississippi, and Atlantic Flyways in 1960-61, and in all flyways in 1961-62 and 1962-63.

¹ Ratio not shown if based on less than 20 wings.

² In estimating Flyway and U.S. ratios, the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

TABLE B-5.--Species composition, by flyway, 1961-62

| Species | Pacific Flyway | | Central Flyway | | Mississippi Flyway | | | Atlantic Flyway | | |
|------------------------|----------------|--------|----------------|--------|--------------------|--------|--------|-----------------|-------|--------|
| | 1961 | 1962 | 1961 | 1962 | 1960 | 1961 | 1962 | 1960 | 1961 | 1962 |
| Ducks: | | | | | | | | | | |
| Dabblers: | | | | | | | | | | |
| Mallard----- | 34.3 | 31.8 | 54.1 | 49.0 | 53.0 | 48.9 | 40.0 | 14.3 | 14.6 | 15.6 |
| Black duck----- | 0.0 | 0.0 | 0.2 | 0.1 | 4.3 | 3.4 | 3.9 | 30.7 | 27.1 | 28.9 |
| Mottled duck----- | 0.0 | 0.0 | 1.7 | 1.9 | 0.4 | 1.0 | 0.6 | 2.1 | 3.5 | 1.9 |
| Gadwall----- | 2.0 | 2.7 | 3.3 | 8.1 | 1.9 | 2.3 | 2.8 | 1.2 | 0.5 | 0.9 |
| American widgeon----- | 17.2 | 13.0 | 6.6 | 6.2 | 4.7 | 5.7 | 4.8 | 4.3 | 4.0 | 3.8 |
| Green-winged teal----- | 12.4 | 13.1 | 12.6 | 10.7 | 5.9 | 8.2 | 6.2 | 8.3 | 6.9 | 5.9 |
| Blue winged teal----- | 2.0 | 3.2 | 1.1 | 2.0 | 5.5 | 2.4 | 4.1 | 1.9 | 1.9 | 1.4 |
| Shoveler----- | 7.4 | 6.5 | 2.8 | 3.5 | 1.6 | 1.0 | 1.3 | 0.4 | 0.4 | 0.5 |
| Pintail----- | 18.4 | 21.6 | 6.3 | 10.2 | 4.2 | 4.6 | 4.8 | 2.7 | 2.4 | 2.2 |
| Wood duck----- | 0.6 | 0.6 | 1.0 | 1.9 | 4.8 | 6.1 | 15.3 | 12.5 | 17.1 | 15.8 |
| Divers: | | | | | | | | | | |
| Redhead----- | 0.2 | 0.2 | 0.4 | 0.3 | 0.2 | 0.1 | 0.2 | 0.1 | Tr. | 0.1 |
| Canvasback----- | 0.1 | Tr. | Tr. | Tr. | Tr. | Tr. | Tr. | 0.0 | Tr. | Tr. |
| Greater scaup----- | 0.3 | 1.8 | 0.2 | 0.2 | 0.9 | 0.5 | 1.0 | 3.8 | 2.1 | 4.2 |
| Lesser scaup----- | 1.2 | 1.1 | 6.6 | 2.5 | 3.4 | 8.9 | 4.1 | 1.2 | 4.0 | 2.0 |
| Ringnecked duck----- | 0.6 | 0.4 | 1.7 | 2.3 | 6.5 | 4.4 | 7.7 | 5.7 | 6.7 | 6.3 |
| Goldeneye----- | 0.9 | 0.7 | 0.3 | 0.2 | 0.5 | 0.3 | 0.6 | 2.9 | 1.9 | 2.1 |
| Bufflehead----- | 1.0 | 1.2 | 0.4 | 0.5 | 0.7 | 1.0 | 1.0 | 1.9 | 1.7 | 1.9 |
| Ruddy duck----- | 1.2 | 1.2 | 0.2 | 0.3 | 0.6 | 0.2 | 0.5 | 0.4 | 0.3 | 0.5 |
| Miscellaneous: | | | | | | | | | | |
| Oldsquaw & Eider----- | Tr. | 0.1 | 0.0 | 0.0 | Tr. | 0.1 | Tr. | 0.8 | 0.1 | 0.6 |
| Scoter----- | 0.2 | 0.4 | Tr. | Tr. | 0.1 | Tr. | Tr. | 1.4 | 1.9 | 1.7 |
| Merganser----- | 0.1 | 0.1 | Tr. | Tr. | 0.2 | 0.1 | 0.1 | 0.8 | 0.1 | 0.8 |
| Hooded Merganser----- | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 | 0.5 | 0.6 | 1.3 | 1.2 | 1.6 |
| Other ducks----- | Tr. | 0.1 | 0.3 | 0.2 | 0.3 | 0.2 | 0.4 | 1.2 | 1.6 | 1.1 |
| Percent----- | 100.2 | 99.9 | 99.9 | 100.2 | 100.0 | 99.9 | 100.0 | 99.9 | 100.0 | 99.8 |
| Number of wings----- | 11,137 | 16,119 | 8,765 | 10,494 | 22,597 | 13,770 | 23,242 | 13,109 | 9,282 | 16,317 |

C. WINTER SURVEY TABLES AND CHARTS

TABLE C-1. --Participation in winter survey, 1963

| Location | Number of observers | | | | Aerial coverage | | | Nonaerial miles traveled |
|----------------------|---------------------|-------------------|-------|-------|------------------|-------------|-------------|--------------------------|
| | United States | State or Province | Other | Total | Number of Planes | Hours flown | Miles flown | |
| United States: | | | | | | | | |
| Pacific Flyway----- | 54 | 251 | 3 | 308 | 39 | 293 | 28,965 | 26,002 |
| Central Flyway----- | 73 | 234 | 2 | 309 | 30 | 192 | 21,668 | 25,620 |
| Mississippi Flyway-- | 82 | 605 | -- | 687 | 53 | 207 | 20,382 | 40,979 |
| Atlantic Flyway----- | 42 | 241 | 23 | 306 | 29 | 250 | 25,795 | 11,216 |
| Total----- | 251 | 1,331 | 28 | 1,610 | 151 | 942 | 96,810 | 103,817 |
| Virgin Islands----- | 1 | -- | 3 | 4 | 1 | 3 | 275 | 36 |
| Canada----- | 5 | 18 | 109 | 132 | 5 | 25 | 2,412 | 516 |
| Mexico----- | 6 | -- | -- | 6 | 2 | 102 | 12,824 | -- |
| Grand total----- | 263 | 1,349 | 140 | 1,752 | 159 | 1,072 | 112,321 | 104,369 |

TABLE C-2.--Number of birds observed, by species, Pacific Flyway
extended, winter survey, 1962 and 1963¹

| Species | 1962 | | 1963 | | Percent change |
|-----------------------|----------------------|---------|---------------------|---------|-------------------|
| | Number | Percent | Number | Percent | |
| Ducks: | | | | | |
| Dabblers: | | | | | |
| Mallard----- | 2,040,355 | 21.5 | 2,642,011 | 26.3 | +29 |
| Gadwall----- | 57,366 | 0.7 | 126,869 | 1.2 | +221 |
| American widgeon--- | 1,078,653 | 11.4 | 1,162,713 | 11.5 | +8 |
| Green-winged teal-- | 485,318 | 5.2 | 418,703 | 4.1 | -14 |
| Blue-winged teal--- | 67,197 | 0.9 | 84,600 | 0.8 | +26 |
| Shoveler----- | 338,729 | 3.5 | 497,319 | 4.9 | +47 |
| Pintail----- | 2,476,439 | 26.2 | 2,072,821 | 20.6 | -16 |
| Wood duck----- | 9,782 | 0.2 | 1,185 | Trace | -- |
| Tree duck----- | -- | -- | 40,545 | 0.4 | -- |
| Subtotal----- | 6,553,839 | 69.6 | 7,046,766 | 69.8 | +7 |
| Divers: | | | | | |
| Redhead----- | 19,090 | 0.3 | 45,406 | 0.4 | +238 |
| Canvasback----- | 44,934 | 0.5 | 100,824 | 1.0 | +224 |
| Scaup----- | 288,012 | 3.0 | 437,285 | 4.3 | +52 |
| Ring-necked duck--- | 7,047 | Trace | 7,220 | Trace | +2 |
| Goldeneye----- | 45,246 | 0.5 | 59,953 | 0.5 | +32 |
| Bufflehead----- | 31,412 | 0.4 | 34,438 | 1.9 | +10 |
| Ruddy duck----- | 129,077 | 1.4 | 193,229 | 1.9 | +50 |
| Subtotal----- | 564,818 | 6.1 | 878,355 | 8.4 | +55 |
| Miscellaneous: | | | | | |
| Eider and scoter--- | 113,713 | 1.2 | 103,251 | 1.0 | -9 |
| Oldsquaw----- | 227 | Trace | 300 | Trace | -- |
| Merganser----- | 20,104 | 0.3 | 36,074 | 0.3 | +79 |
| Subtotal----- | 134,044 | 1.5 | 139,625 | 1.3 | +4 |
| Unidentified----- | 112,682 ² | 1.3 | 97,737 ³ | 0.9 | -- |
| Total ducks----- | 7,365,383 | 78.5 | 8,162,483 | 82.2 | +12 |
| Geese: | | | | | |
| Snow goose----- | 541,015 | 5.7 | 482,911 | 4.8 | -11 |
| Ross's goose----- | 27,920 | 0.3 | 25,253 | 0.2 | -9 |
| White-fronted goose-- | 199,545 | 2.2 | 128,566 | 1.3 | -35 |
| Canada goose----- | 263,776 | 2.8 | 206,257 | 2.0 | -22 |
| Cackling goose----- | 190,778 | 2.1 | 238,327 | 2.4 | +25 |
| Total geese----- | 1,223,034 | 13.1 | 1,081,314 | 10.7 | -11 |
| Black brant----- | 170,286 | 1.9 | 140,025 | 1.4 | -18 |
| Swan: | | | | | |
| Whistling swan----- | 32,935 | 0.4 | 46,772 | 0.5 | +42 |
| Trumpeter swan----- | 428 | Trace | 170 | Trace | -- |
| Total swan----- | 33,363 | 0.4 | 46,942 | 0.5 | +41 |
| Coot----- | 702,640 | 7.4 | 605,103 | 6.0 | -14 |
| Grand total | 9,494,706 | 100.0 | 10,035,867 | 100.0 | +6 |

¹ Based on observed ducks.

² Includes (5,619) cinnamon teal, and (25,398) tree ducks in addition to unidentified.

³ Includes (4,969) cinnamon teal, and (14) harlequin ducks in addition to unidentified.

**TABLE C-3.--Distribution of wintering waterfowl,
Pacific Flyway extended, 1959-63**

[Index numbers]

| | 1959 | 1960 | 1961 | 1962 ¹ | 1963 ¹ |
|------------------------|------------|-----------|------------|-------------------|---------------------|
| Alaska----- | 31,941 | 15,420 | 24,194 | 4,845 | Discontinued |
| British Columbia----- | 56,364 | 63,903 | 153,980 | 136,440 | 71,580 |
| Washington----- | 1,123,077 | 1,225,126 | 1,291,347 | 1,307,788 | 1,511,001 |
| Oregon----- | 998,266 | 1,018,989 | 1,034,976 | 730,011 | 579,074 |
| California----- | 6,326,609 | 5,072,667 | 5,396,143 | 4,814,599 | 5,069,655 |
| Idaho----- | 705,764 | 578,351 | 553,390 | 550,015 | 1,071,281 |
| Nevada----- | 204,688 | 58,998 | 54,782 | 51,081 | 45,923 |
| Utah----- | 101,703 | 39,895 | 68,307 | 42,716 | 103,588 |
| Arizona----- | 67,221 | 64,292 | 54,877 | 55,366 | 74,519 |
| Montana: West----- | -- | -- | -- | -- | 33,294 ² |
| Colorado: West----- | -- | -- | -- | -- | 6,805 ² |
| New Mexico: West----- | -- | -- | -- | -- | 3,333 ² |
| Wyoming: West----- | -- | -- | -- | -- | 3,210 ² |
| Mexico: West coast---- | 1,870,730 | 1,531,207 | 1,623,317 | 1,801,845 | 1,462,604 |
| Total----- | 11,486,453 | 9,668,848 | 10,255,313 | 9,494,706 | 10,035,867 |
| Comparable coverage: | | | | | |
| 1956-1957----- | -- | -- | -- | -- | -- |
| 1957-1958----- | -- | -- | -- | -- | -- |
| 1958-1959----- | 11,486,453 | -- | -- | -- | -- |
| 1959-1960----- | 11,478,654 | 9,637,563 | -- | -- | -- |
| 1960-1961----- | -- | 9,668,848 | 10,251,006 | -- | -- |

¹ Winter survey figures are based upon observed waterfowl and have not been adjusted for comparable coverage.

² Areas west of Continental Divide added to Pacific Flyway.

TABLE C-4.--Trend in waterfowl numbers, Pacific Flyway extended,
winter survey, 1949-63

[In thousands]

| Year | Ducks | Geese | Brant | Swan | Coot | Total |
|-----------|--------------------|--------------------|-------|------|-------|--------|
| 1949----- | 9,008 | 980 | 123 | 17 | 773 | 10,901 |
| 1950----- | 7,082 | 730 | 144 | 18 | 407 | 8,381 |
| 1951----- | 6,619 | 1,000 ¹ | 151 | 33 | 769 | 8,572 |
| 1952----- | 6,646 | 917 | 167 | 20 | 520 | 8,270 |
| 1953----- | 7,352 | 952 | 154 | 29 | 796 | 9,283 |
| 1954----- | 7,813 | 884 | 132 | 28 | 1,169 | 10,026 |
| 1955----- | 7,288 | 872 | 135 | 36 | 717 | 9,048 |
| 1956----- | 7,929 | 961 | 110 | 48 | 885 | 9,933 |
| 1957----- | 6,593 ² | 749 | 128 | 44 | 952 | 8,466 |
| 1958----- | 8,582 | 800 | 126 | 51 | 815 | 10,394 |
| 1959----- | 9,452 | 918 | 68 | 40 | 1,007 | 11,485 |
| 1960----- | 7,760 | 883 | 105 | 36 | 859 | 9,643 |
| 1961----- | 7,780 | 1,100 | 134 | 41 | 1,162 | 10,217 |
| 1962----- | 7,365 | 1,223 | 170 | 34 | 703 | 9,495 |
| 1963----- | 8,162 | 1,081 | 140 | 47 | 605 | 10,036 |

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years. The 1962 figures are based upon only observed birds and are not adjusted.

¹ Index arbitrarily reduced from 1,797,000 to 1 million geese. During January 1951, more geese were estimated to be in Merced County, California, than were in the entire flyway either the previous or the following year. It seems certain that the estimate was in error. If the geese recorded in Merced County are deleted from the totals for 1950, 1951, and 1952, and a revised estimate is calculated based on change observed in the remaining areas, the index for 1951 is about 1 million birds.

² No surveys were conducted in Mexico in 1957. The data indicate that it is unlikely that surveys in the United States, Canada, and Alaska accurately revealed the trend in wintering populations of ducks that year.

TABLE C-5.--Number of birds observed, by species, Central Flyway extended, winter survey, 1962 and 1963

| Species | 1962 ¹ | | 1963 ¹ | | Percent change |
|-----------------------|-------------------|---------|-------------------|---------|----------------|
| | Number | Percent | Number | Percent | |
| Ducks: | | | | | |
| Dabblers: | | | | | |
| Mallard----- | 1,467,356 | 33.0 | 1,659,559 | 32.4 | +13 |
| Black duck----- | 5,852 | Trace | 2,948 | Trace | -- |
| Mottled duck----- | 3,162 | Trace | 7,030 | 0.1 | +222 |
| Gadwall----- | 43,700 | 1.0 | 95,565 | 1.8 | +219 |
| American widgeon-- | 223,231 | 5.0 | 252,100 | 4.9 | +13 |
| Green-winged teal-- | 98,134 | 2.2 | 223,500 | 4.4 | +228 |
| Blue-winged teal-- | 123,263 | 3.0 | 60,855 | 1.2 | -51 |
| Shoveler----- | 65,488 | 1.5 | 65,793 | 1.3 | No count |
| Pintail----- | 586,231 | 13.2 | 602,685 | 11.8 | +3 |
| Wood duck----- | 3,034 | Trace | 1,251 | Trace | -- |
| Tree duck----- | 24,354 | .5 | 32,714 | 0.6 | +34 |
| Subtotal----- | 2,643,805 | 59.1 | 3,004,000 | 58.7 | +14 |
| Divers: | | | | | |
| Redhead----- | 347,905 | 8.0 | 395,044 | 7.7 | +14 |
| Canvasback----- | 8,647 | .2 | 21,382 | 0.4 | +247 |
| Scaup----- | 251,632 | 6.0 | 315,358 | 6.2 | +25 |
| Ring-necked duck-- | 4,423 | .1 | 36,593 | 0.7 | -- |
| Goldeneye----- | 14,966 | .3 | 11,034 | 0.2 | -26 |
| Bufflehead----- | 1,481 | Trace | 5,833 | 0.1 | -- |
| Ruddy duck----- | 3,123 | Trace | 10,108 | 0.2 | -- |
| Subtotal----- | 632,177 | 14.6 | 795,352 | 15.5 | +26 |
| Miscellaneous: | | | | | |
| Elder and scoter-- | 5 | -- | -- | -- | -- |
| Merganser----- | 52,888 | 1.2 | 82,450 | 1.6 | +56 |
| Subtotal----- | 52,893 | 1.2 | 82,450 | 1.6 | +28 |
| Unidentified----- | 105,833 | -- | 139,538 | 2.7 | +32 |
| Total ducks ----- | 3,434,708 | 74.9 | 4,021,340 | 78.6 | +17 |
| Geese: | | | | | |
| Snow goose----- | 218,688 | 5.0 | 405,309 | 7.9 | +85 |
| Blue goose----- | 421 | Trace | 20 | Trace | -- |
| White-fronted goose-- | 23,747 | .5 | 58,666 | 1.1 | +247 |
| Canada goose----- | 163,712 | 4.0 | 201,573 | 3.9 | +23 |
| Total geese----- | 406,568 | 9.5 | 665,568 | 13.0 | +64 |
| Swan: | | | | | |
| Whistling swan----- | 55 | Trace | 5 | Trace | -- |
| Trumpeter swan----- | 137 | Trace | 258 | Trace | -- |
| Total swan----- | 192 | Trace | 263 | Trace | +37 |
| Coot----- | 642,504 | 14.3 | 429,276 | 8.4 | -33 |
| Grand total----- | 4,483,972 | 100.0 | 5,116,447 | 100.0 | +14 |

¹ Based on observed waterfowl.

TABLE C-6. --Distribution of wintering waterfowl, Central Flyway extended, 1959-63

| [Index numbers] | | | | | |
|-----------------------------|-----------|-----------|-----------|-------------------|-------------------|
| Area | 1959 | 1960 | 1961 | 1962 ¹ | 1963 ¹ |
| Montana----- | 127,791 | 74,331 | 89,009 | 82,385 | 112,714 |
| North Dakota----- | 2,100 | 31 | 2,127 | 200 | 18,717 |
| South Dakota----- | 605,243 | 93,638 | 353,967 | 156,091 | 286,327 |
| Wyoming----- | 75,700 | 79,662 | 51,620 | 49,467 | 55,047 |
| Nebraska----- | 331,855 | 306,412 | 204,039 | 134,262 | 167,731 |
| Colorado----- | 473,669 | 437,045 | 387,710 | 300,638 | 246,465 |
| Kansas----- | 355,447 | 379,557 | 492,326 | 311,686 | 362,644 |
| New Mexico----- | 143,111 | 82,373 | 93,343 | 148,245 | 195,678 |
| Oklahoma----- | 193,685 | 114,211 | 106,278 | 151,077 | 264,778 |
| Texas----- | 3,675,032 | 2,384,384 | 2,109,680 | 1,890,952 | 2,319,848 |
| Mexico: | | | | | |
| East coast----- | 1,268,048 | 817,896 | 1,344,340 | 979,374 | 778,714 |
| Central----- | 1,097,771 | 518,181 | 522,803 | 279,623 | 307,784 |
| Central America----- | -- | 28,470 | -- | -- | -- |
| Northern South America----- | -- | 475,254 | -- | -- | -- |
| Total----- | 8,349,452 | 5,791,445 | 5,757,242 | 4,484,000 | 5,116,447 |
| Comparable coverage: | | | | | |
| 1956-1957----- | -- | -- | -- | -- | -- |
| 1957-1958----- | -- | -- | -- | -- | -- |
| 1958-1959----- | 8,263,472 | -- | -- | -- | -- |
| 1959-1960----- | 8,334,711 | 5,268,271 | -- | -- | -- |
| 1960-1961----- | -- | 5,271,839 | 5,689,872 | -- | -- |

¹ Winter survey figures are based upon observed waterfowl and have not been adjusted for comparable coverage.

TABLE C-7.--Trend in waterfowl numbers, Central
Flyway extended, winter survey, 1949-63

[In thousands]

| Year | Ducks | Geese | Coot | Total |
|-----------|--------------------|-------|------------------|-------|
| 1949----- | 4,256 | 1,031 | 1,139 | 6,426 |
| 1950----- | 5,542 | 839 | 615 | 6,996 |
| 1951----- | 4,733 | 507 | 375 | 5,615 |
| 1952----- | 6,116 | 409 | 1,017 | 7,542 |
| 1953----- | 5,591 | 512 | 578 | 6,681 |
| 1954----- | 6,441 | 723 | 1,322 | 8,486 |
| 1955----- | 5,746 | 521 | 594 | 6,861 |
| 1956----- | 7,814 | 693 | 1,025 | 9,532 |
| 1957----- | 4,248 ¹ | 443 | 364 ¹ | 5,055 |
| 1958----- | 8,202 | 567 | 812 | 9,581 |
| 1959----- | 7,233 | 425 | 691 | 8,349 |
| 1960----- | 4,240 | 501 | 536 | 5,277 |
| 1961----- | 4,447 | 461 | 788 | 5,696 |
| 1962----- | 3,434 ² | 407 | 643 | 4,484 |
| 1963----- | 4,021 | 665 | 429 | 5,166 |

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years. The 1962 figures are based upon only observed birds and are not adjusted.

¹ No surveys were conducted in Mexico in 1957. The data indicate that it is unlikely that surveys in the United States alone accurately revealed the trend in wintering population for either ducks or coot that year.

² Includes 111,718 miscellaneous unidentified birds.

TABLE C-8.--Number of birds observed, by species, Mississippi Flyway extended, winter survey, 1962 and 1963

| Species | 1962 ¹ | | 1963 ¹ | | Percent change |
|-----------------------|-------------------|---------|-------------------|---------|----------------|
| | Number | Percent | Number | Percent | |
| Ducks: | | | | | |
| Dabblers: | | | | | |
| Mallard----- | 1,995,376 | 25.2 | 2,733,263 | 31.5 | +37 |
| Black duck----- | 112,784 | 1.4 | 148,086 | 1.7 | +31 |
| Mottled duck----- | 28,100 | -- | 32,100 | 0.4 | -- |
| Gadwall----- | 407,484 | 5.1 | 373,396 | 4.3 | -8 |
| American widgeon--- | 362,834 | 4.6 | 255,816 | 2.9 | -29 |
| Green-winged teal-- | 520,549 | 6.6 | 509,632 | 5.9 | -2 |
| Blue-winged teal--- | 300,800 | 3.8 | 222,510 | 2.5 | -26 |
| Shoveler----- | 279,402 | 3.5 | 264,545 | 3.0 | -5 |
| Pintail----- | 577,694 | 7.3 | 729,025 | 8.4 | +26 |
| Wood duck----- | 24,953 | 0.3 | 38,602 | 0.4 | -- |
| Subtotal----- | 4,609,976 | 57.8 | 5,306,975 | 61.1 | +15 |
| Divers: | | | | | |
| Redhead----- | 10,461 | 0.1 | 22,055 | 0.2 | +211 |
| Canvasback----- | 40,690 | 0.6 | 44,073 | 0.5 | +8 |
| Scaup----- | 1,766,291 | 22.2 | 1,684,987 | 19.4 | -5 |
| Ring-necked duck--- | 123,665 | 1.6 | 108,632 | 1.2 | -12 |
| Goldeneye----- | 27,818 | 0.3 | 34,122 | 0.4 | +23 |
| Bufflehead----- | 3,562 | Trace | 2,311 | Trace | -- |
| Ruddy duck----- | 25,691 | 0.3 | 20,655 | 0.2 | -20 |
| Subtotal----- | 1,998,178 | 25.1 | 1,916,835 | 22.1 | -4 |
| Miscellaneous: | | | | | |
| Eider and scoter--- | 268 | Trace | 5 | Trace | -- |
| Oldsquaw----- | 2,462 | Trace | 9,261 | 0.1 | -- |
| Merganser----- | 56,998 | 0.7 | 65,207 | 0.7 | +14 |
| Subtotal----- | 59,728 | 0.7 | 74,473 | 0.8 | +25 |
| Unidentified----- | 9,449 | -- | 14,801 | 0.2 | -- |
| Total ducks----- | 6,677,331 | 84.0 | 7,313,084 | 84.2 | +10 |
| Geese: | | | | | |
| Snow goose----- | 45,152 | 4.3 | 69,033 | 0.8 | +53 |
| Blue goose----- | 323,844 | 4.1 | 373,040 | 4.3 | +15 |
| White-fronted goose-- | 20,010 | 0.2 | 32,150 | 0.4 | +61 |
| Canada goose----- | 339,507 | 4.3 | 437,952 | 5.0 | +29 |
| Total geese----- | 728,513 | 9.2 | 912,175 | 10.5 | +25 |
| Swan: | | | | | |
| Whistling swan----- | 181 | Trace | 11 | -- | -- |
| Mute----- | -- | -- | 183 | -- | -- |
| Subtotal----- | 181 | -- | 194 | -- | -- |
| Coot----- | 569,190 | 7.2 | 452,324 | 5.2 | -21 |
| Grand total----- | 7,975,215 | 100.0 | 8,677,777 | 100.0 | +9 |

¹ Based on observed waterfowl.

**TABLE C-9.--Distribution of wintering waterfowl,
Mississippi Flyway extended, 1959-63**

| [Index numbers] | | | | | |
|----------------------|-----------|-----------|-----------|-------------------|-------------------|
| Area | 1959 | 1960 | 1961 | 1962 ¹ | 1963 ¹ |
| Ontario----- | 63,501 | 70,742 | 55,754 | 27,936 | 56,370 |
| Minnesota----- | 13,302 | 8,418 | 14,577 | 8,612 | 15,617 |
| Wisconsin----- | 37,101 | 55,722 | 81,201 | 38,447 | 40,842 |
| Michigan----- | 142,209 | 53,058 | 50,635 | 21,252 | 44,275 |
| Iowa----- | 121,473 | 47,659 | 378,755 | 9,976 | 148,706 |
| Missouri----- | 357,760 | 250,769 | 293,211 | 287,804 | 373,445 |
| Illinois----- | 728,071 | 663,071 | 549,605 | 264,899 | 663,434 |
| Indiana----- | 485,136 | 355,210 | 274,093 | 24,966 | 82,919 |
| Ohio----- | 56,119 | 77,775 | 149,322 | 51,123 | 65,009 |
| Kentucky----- | 245,100 | 95,500 | 67,200 | 130,200 | 111,220 |
| Arkansas----- | 1,443,900 | 1,336,533 | 1,282,800 | 945,500 | 1,191,460 |
| Tennessee----- | 585,800 | 310,203 | 360,100 | 212,500 | 302,510 |
| Louisiana----- | 3,372,000 | 4,343,000 | 5,462,000 | 5,514,900 | 5,240,570 |
| Mississippi----- | 118,600 | 139,304 | 125,700 | 227,900 | 157,400 |
| Alabama----- | 118,800 | 118,286 | 183,000 | 209,200 | 184,000 |
| Total----- | 7,888,872 | 7,925,250 | 9,327,953 | 7,975,215 | 8,677,777 |
| Comparable coverage: | | | | | |
| 1956-1957----- | -- | -- | -- | -- | -- |
| 1957-1958----- | -- | -- | -- | -- | -- |
| 1958-1959----- | 7,883,372 | -- | -- | -- | -- |
| 1959-1960----- | 7,886,407 | 7,882,450 | -- | -- | -- |
| 1960-1961----- | -- | 7,925,227 | 9,274,495 | -- | -- |

¹ Winter survey figures are based upon observed waterfowl and have not been adjusted for comparable coverage.

**TABLE C-10.--Trend in waterfowl numbers, Mississippi
Flyway extended, winter survey, 1949-63**

| [In thousands] | | | | |
|----------------|--------------------|-------|------|-------|
| Year | Ducks | Geese | Coot | Total |
| 1949----- | 4,164 | 680 | 265 | 5,109 |
| 1950----- | 2,842 | 601 | 211 | 3,654 |
| 1951----- | 5,640 | 625 | 251 | 6,516 |
| 1952----- | 3,961 | 559 | 404 | 4,924 |
| 1953----- | 5,240 | 664 | 100 | 6,004 |
| 1954----- | 5,403 | 783 | 123 | 6,309 |
| 1955----- | 5,344 | 680 | 132 | 6,156 |
| 1956----- | 7,460 | 768 | 137 | 8,365 |
| 1957----- | 7,716 | 737 | 187 | 8,640 |
| 1958----- | 6,759 | 750 | 295 | 7,804 |
| 1959----- | 6,890 | 711 | 288 | 7,889 |
| 1960----- | 6,684 | 767 | 434 | 7,885 |
| 1961----- | 7,802 | 902 | 524 | 9,228 |
| 1962----- | 6,677 ¹ | 729 | 569 | 7,975 |
| 1963----- | 7,313 | 912 | 452 | 8,678 |

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years. The 1962 figures are based upon only observed birds and are not adjusted.

¹ Includes 37,549 miscellaneous and unidentified birds.

TABLE C-11.--Number of birds observed, by species, Atlantic Flyway extended, winter survey, 1962 and 1963

| Species | 1962 | | 1963 | | Percent change |
|---------------------|-----------|---------|-----------|---------|----------------|
| | Number | Percent | Number | Percent | |
| Ducks: | | | | | |
| Dabblers: | | | | | |
| Mallard----- | 148,805 | 5.0 | 252,680 | 6.4 | +70 |
| Black duck----- | 344,879 | 11.0 | 334,780 | 8.5 | -3 |
| Mottled duck----- | 3,400 | 0.1 | 5,400 | 0.1 | -- |
| Gadwall----- | 40,000 | 1.2 | 37,720 | 0.5 | -6 |
| American widgeon--- | 114,214 | 3.5 | 114,610 | 2.9 | -- |
| Green-winged teal-- | 73,113 | 2.2 | 110,394 | 2.8 | +51 |
| Blue-winged teal--- | 28,499 | 0.8 | 34,310 | 0.9 | +20 |
| Shoveler----- | 13,400 | 0.4 | 21,690 | 0.5 | +62 |
| Pintail----- | 176,584 | 5.4 | 181,700 | 4.6 | +3 |
| Wood duck----- | 13,000 | 0.4 | 19,230 | 0.4 | -- |
| Subtotal----- | 955,894 | 30.0 | 1,112,514 | 28.1 | +16 |
| Divers: | | | | | |
| Redhead----- | 98,100 | 3.0 | 130,576 | 3.3 | +33 |
| Canvasback----- | 137,600 | 4.2 | 164,050 | 4.1 | +19 |
| Scaup----- | 707,900 | 22.0 | 611,773 | 15.5 | -14 |
| Ring-necked duck--- | 78,600 | 2.4 | 134,310 | 3.4 | +71 |
| Goldeneye----- | 79,350 | 2.4 | 100,010 | 2.5 | +26 |
| Bufflehead----- | 30,159 | 1.0 | 36,912 | 0.9 | +22 |
| Ruddy duck----- | 85,911 | 3.0 | 62,820 | 1.6 | -27 |
| Subtotal----- | 1,217,620 | 38.0 | 1,240,451 | 31.3 | +2 |
| Miscellaneous: | | | | | |
| Eider and scoter--- | 82,058 | 2.5 | 200,918 | 5.1 | -- |
| Oldsquaw----- | 6,807 | 0.2 | 21,080 | 0.5 | -- |
| Merganser----- | 78,958 | 2.4 | 55,945 | 1.4 | -29 |
| Subtotal----- | 167,823 | 5.1 | 277,943 | 7.0 | +10 |
| Unidentified----- | 43,936 | 1.3 | 233,828 | 5.9 | -- |
| Total ducks----- | 2,385,273 | 73.4 | 2,864,736 | 72.4 | +20 |
| Geese: | | | | | |
| Snow goose----- | 49,700 | 1.5 | 64,920 | 1.6 | +31 |
| Blue goose----- | 400 | Trace | 120 | Trace | -- |
| Canada goose----- | 418,895 | 13.0 | 480,816 | 12.1 | +15 |
| Total geese----- | 468,995 | 14.5 | 545,856 | 13.8 | +16 |
| American brant----- | 124,600 | 4.0 | 167,405 | 4.2 | +34 |
| Whistling swan----- | 39,400 | 1.2 | 61,452 | 1.5 | +56 |
| Coot----- | 230,376 | 7.2 | 323,540 | 8.1 | +40 |
| Grand total----- | 3,248,644 | 100.0 | 3,962,989 | 100.0 | +22 |

TABLE C-12.--Distribution of wintering waterfowl, Atlantic Flyway extended, 1959-63

| [Index numbers] | | | | | |
|-----------------------------|-----------|-----------|-----------|-------------------|-------------------|
| Area | 1959 | 1960 | 1961 | 1962 ² | 1963 ² |
| Newfoundland----- | 8,466 | 7,091 | 13,797 | 16,855 | 76,752 |
| Quebec----- | 952 | 819 | 2,018 | 436 | 8,379 |
| Maritime Provinces---- | 33,288 | 33,773 | 21,350 | 16,191 | 18,164 |
| Maine----- | 39,909 | 47,971 | 40,362 | 50,200 | 57,000 |
| New Hampshire----- | 1,178 | 3,014 | 3,385 | 6,700 | 4,000 |
| Massachusetts----- | 63,844 | 100,600 | 83,209 | 119,300 | 104,800 |
| Connecticut----- | 46,816 | 58,805 | 54,294 | 54,200 | 53,000 |
| Rhode Island----- | 27,933 | 34,594 | 22,718 | 24,000 | 27,500 |
| New York ¹ ----- | 208,895 | 268,026 | 264,859 | 299,900 | 442,632 |
| New Jersey----- | 313,414 | 389,680 | 345,556 | 247,900 | 256,000 |
| Pennsylvania----- | 19,990 | 33,719 | 18,682 | 22,200 | 18,900 |
| Delaware----- | 33,102 | 71,875 | 101,592 | 97,800 | 50,400 |
| Maryland----- | 329,600 | 476,900 | 637,200 | 526,000 | 569,500 |
| Virginia----- | 103,300 | 162,202 | 202,900 | 162,600 | 176,730 |
| West Virginia----- | 11,834 | 1,857 | 2,532 | 2,900 | 11,800 |
| North Carolina----- | 334,600 | 416,100 | 548,000 | 360,500 | 401,820 |
| South Carolina----- | 702,100 | 678,765 | 578,600 | 474,100 | 777,400 |
| Georgia----- | 81,700 | 47,152 | 86,900 | 47,500 | 50,912 |
| Florida----- | 775,900 | 552,040 | 782,200 | 718,400 | 857,300 |
| West Indies----- | 36,560 | -- | -- | -- | -- |
| Total----- | 3,173,381 | 3,384,983 | 3,810,154 | 3,247,682 | 3,962,989 |
| Comparable coverage: | | | | | |
| 1956-1957----- | -- | -- | -- | -- | -- |
| 1957-1958----- | -- | -- | -- | -- | -- |
| 1958-1959----- | 3,232,138 | -- | -- | -- | -- |
| 1959-1960----- | 3,133,558 | 3,367,948 | -- | -- | -- |
| 1960-1961----- | -- | 3,380,148 | 3,806,254 | -- | -- |

¹ Vermont included with New York.

² Winter survey figures are based upon observed waterfowl and have not been adjusted for comparable coverage.

TABLE C-13.--Trend in waterfowl numbers, Atlantic Flyway extended, winter survey, 1949-63

| [In thousands] | | | | | | |
|----------------|-------|-------|-------|------|-------|-------|
| Year | Ducks | Geese | Brant | Swan | Coot | Total |
| 1949----- | 2,685 | 365 | 75 | 42 | 863 | 4,030 |
| 1950----- | 2,757 | 349 | 77 | 31 | 661 | 3,875 |
| 1951----- | 3,314 | 334 | 114 | 34 | 560 | 4,356 |
| 1952----- | 3,904 | 344 | 104 | 36 | 540 | 4,928 |
| 1953----- | 4,670 | 552 | 155 | 56 | 1,403 | 6,836 |
| 1954----- | 3,879 | 396 | 245 | 53 | 352 | 4,925 |
| 1955----- | 4,344 | 567 | 184 | 90 | 616 | 5,801 |
| 1956----- | 3,892 | 549 | 164 | 39 | 852 | 5,496 |
| 1957----- | 2,862 | 403 | 162 | 40 | 649 | 4,116 |
| 1958----- | 2,271 | 366 | 211 | 28 | 394 | 3,270 |
| 1959----- | 2,278 | 339 | 217 | 28 | 311 | 3,173 |
| 1960----- | 2,365 | 449 | 238 | 41 | 315 | 3,408 |
| 1961----- | 2,566 | 613 | 265 | 61 | 331 | 3,836 |
| 1962----- | 2,384 | 469 | 125 | 39 | 230 | 3,247 |
| 1963----- | 2,865 | 546 | 167 | 61 | 324 | 3,963 |

Note.--Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years. The 1962 and 1963 figures are based upon only observed birds and are not adjusted.

TABLE C-14.--Number of birds, by species, east coast
of Mexico, winter survey, January 1963

| Species | 1963 | 1962 | Percent change from 1962 | Percent change from 5-year average |
|---------------------|---------|---------|-----------------------------------|--|
| Ducks: | | | | |
| Dabblers: | | | | |
| Mallard----- | 212 | 30 | +607 | +54 |
| Mottled duck----- | 243 | 212 | +15 | +17 |
| Gadwall----- | 21,753 | 18,306 | +19 | +0.4 |
| American widgeon--- | 55,343 | 39,156 | +41 | -30 |
| Green-winged teal-- | 18,086 | 20,233 | -11 | +24 |
| Blue-winged teal--- | 49,736 | 39,263 | +27 | -27 |
| Shoveler----- | 12,672 | 1,946 | +551 | +68 |
| Pintail----- | 32,256 | 55,633 | -42 | -70 |
| Wood duck----- | 83 | -- | -- | -- |
| Tree duck----- | 32,644 | 24,232 | +35 | +57 |
| Subtotal----- | 223,028 | 199,011 | +12 | -30 |
| Divers: | | | | |
| Redhead----- | 43,879 | 2,262 | +1840 | -35 |
| Canvasback----- | 5,724 | 2,582 | +122 | +49 |
| Scaup----- | 76,262 | 191,693 | -60 | -46 |
| Ring-necked duck--- | 26,109 | 2,189 | +1093 | +335 |
| Goldeneye----- | -- | -- | -- | -- |
| Bufflehead----- | 262 | 14 | +1771 | -- |
| Ruddy duck----- | 782 | -- | -- | -18 |
| Subtotal----- | 153,018 | 198,927 | -22 | -30 |
| Miscellaneous: | | | | |
| Merganser----- | 1,301 | -- | -- | -- |
| Unidentified----- | 66,303 | 51,783 | +29 | +75 |
| Total ducks----- | 443,650 | 449,534 | -1.3 | -23 |
| Geese: | | | | |
| Snow----- | 3,140 | 3,725 | -16 | +44 |
| Blue----- | | | | |
| White-fronted----- | 22,478 | 6,358 | +254 | +118 |
| Canada----- | 8,187 | 6,686 | +23 | -- |
| Total geese----- | 33,805 | 16,769 | +102 | +108 |
| Coots----- | 301,259 | 513,071 | -41 | -29 |
| Swans: | | | | |
| Whistling----- | -- | -- | -- | -- |
| Trumpeter----- | -- | -- | -- | -- |
| Grand total----- | 778,714 | 979,374 | -21 | -23 |

TABLE C-15.--Number of birds, by species, west coast of Mexico,
winter survey, January 1963

| Species | 1963 | 1962 ¹ | Percent change from 1962 | 7-year average | Percent change from 7-year average |
|--------------------------------|-----------|-------------------|-----------------------------------|-------------------|---|
| Ducks: | | | | | |
| Dabblers: | | | | | |
| Mallard----- | -- | 45 | -- | 546 | -- |
| Gadwall----- | 41,155 | 31,775 | +30 | 41,414 | -3 |
| American widgeon--- | 76,120 | 64,525 | +18 | 50,901 | +27 |
| Green-winged teal--- | 133,325 | 206,700 | -35 | 189,430 | -30 |
| Blue-winged teal--- | 84,600 | 67,185 | +26 | 47,773 | +30 |
| Shoveler----- | 250,205 | 169,870 | +47 | 208,377 | +12 |
| Pintail----- | 426,387 | 875,480 | -51 | 541,999 | -22 |
| Wood duck----- | -- | -- | -- | -- | -- |
| Tree duck----- | 40,545 | 25,390 | -- | 27,870 | -- |
| Subtotal----- | 1,052,337 | 1,440,970 | -27 | 1,108,260 | -10 |
| Divers: | | | | | |
| Redhead----- | 27,775 | 10,585 | +162 | 21,656 | +28 |
| Canvasback----- | 700 | 75 | +833 | 441 | +59 |
| Scaup----- | 150,910 | 106,160 | +42 | 125,664 | +4 |
| Ring-necked duck--- | 1,300 | -- | -- | 186 | +599 |
| Goldeneye----- | 85 | 110 | -23 | 237 | -64 |
| Bufflehead----- | 95 | 160 | -41 | 224 | -58 |
| Scoter----- | 2,000 | 4,000 | -50 | 964 | +107 |
| Ruddy----- | 32,950 | 6,720 | +390 | 26,752 | -42 |
| Subtotal----- | 215,815 | 127,950 | +70 | 176,708 | +2 |
| Miscellaneous: | | | | | |
| Merganser----- | 1,600 | -- | -- | -- | -- |
| Unidentified----- | 51 | -- | -- | -- | -- |
| Total ducks ² ----- | 1,269,803 | 1,568,920 | -19 | 1,284,968 | -9 |

¹ Includes only areas surveyed both years.

² Disproportionate yearly totals will not check exactly.

TABLE C-16.--Number of birds, by species,
highlands of Mexico,
winter survey, January 1963

| Species | 1963 | 1962 |
|---------------------|---------|--------|
| Ducks: | | |
| Dabblers: | | |
| Mallard----- | 700 | 139 |
| Mexican duck----- | 114 | -- |
| Gadwall----- | 1,637 | 1,318 |
| American widgeon--- | 4,383 | 606 |
| Green-winged teal-- | 27,498 | 2,325 |
| Blue-winged teal--- | 571 | 720 |
| Shoveler----- | 22,470 | 1,559 |
| Pintail----- | 23,706 | 5,456 |
| Wood duck----- | -- | -- |
| Tree duck----- | -- | -- |
| Subtotal----- | 81,079 | 12,123 |
| Divers: | | |
| Redhead----- | 32 | 10 |
| Canvasback----- | 2,128 | 558 |
| Scaup----- | 44 | 10 |
| Ring-necked duck--- | 652 | -- |
| Goldeneye----- | -- | -- |
| Bufflehead----- | 30 | 100 |
| Ruddy duck----- | 3,095 | 398 |
| Subtotal----- | 5,981 | 1,076 |
| Miscellaneous: | | |
| Merganser----- | 947 | 135 |
| Unidentified----- | 31,020 | 12,561 |
| Total ducks----- | 119,027 | 25,895 |
| Geese: | | |
| Snow and Blue----- | 44,400 | 7,841 |
| White-fronted----- | 4,408 | 3,707 |
| Canada----- | -- | 13 |
| Total geese----- | 48,808 | 11,561 |
| Coots----- | 11,349 | 14,137 |
| Swans: | | |
| Whistling----- | -- | -- |
| Trumpeter----- | -- | -- |
| Grand total----- | 179,184 | 51,593 |

TABLE C-17. --Number of birds, by species, southern interior of Mexico,
winter survey, January 1963

| Species | 1963 | 1962 | Percent change from 1962 | 7-year aver- age | Percent change from 7-year average |
|---------------------|---------|---------|--------------------------------|------------------------|---|
| Ducks: | | | | | |
| Dabblers: | | | | | |
| Mallard----- | -- | -- | -- | 8 | -- |
| Mexican duck----- | 2,820 | 5,722 | -51 | 4,227 | -33 |
| Gadwall----- | 9,140 | 1,655 | +452 | 12,221 | -25 |
| American widgeon-- | 12,720 | 6,385 | +99 | 34,860 | -64 |
| Green-winged teal-- | 26,400 | 4,850 | +444 | 31,499 | -16 |
| Blue-winged teal-- | 7,725 | 74,950 | -90 | 33,256 | -77 |
| Shoveler----- | 2,965 | 48,410 | -94 | 44,237 | -93 |
| Pintail----- | 40,560 | 41,150 | -1 | 139,952 | -71 |
| Wood duck----- | -- | -- | -- | -- | -- |
| Tree duck----- | 70 | 35 | +100 | 14 | +400 |
| Subtotal----- | 102,400 | 183,157 | -44 | 300,274 | -66 |
| Divers: | | | | | |
| Redhead----- | -- | -- | -- | 155 | -- |
| Canvasback----- | 1,925 | 1,345 | -43 | 11,607 | -83 |
| Scaup----- | 200 | 4,330 | -95 | 3,967 | -95 |
| Ring-necked duck-- | 50 | -- | -- | 6 | +733 |
| Goldeneye----- | -- | -- | -- | -- | -- |
| Bufflehead----- | 50 | -- | -- | 8 | +525 |
| Ruddy duck----- | 825 | 360 | +129 | 1,658 | -50 |
| Subtotal----- | 3,050 | 6,035 | -49 | 17,401 | -82 |
| Unidentified----- | -- | -- | -- | -- | -- |
| Total ducks----- | 105,450 | 189,192 | -44 | 317,675 | -67 |
| Geese: | | | | | |
| Snow----- | 950 | 50 | +1,800 | 1,122 | -15 |
| Blue----- | -- | -- | -- | -- | -- |
| White-fronted----- | 1,400 | 670 | +109 | 1 | -53 |
| Canada----- | -- | -- | -- | -- | -- |
| Total geese----- | 2,350 | 720 | +220 | 4,071 | -42 |
| Coots----- | 20,800 | 10,585 | +97 | 24,508 | -15 |
| Swans: | | | | | |
| Whistling----- | -- | -- | -- | -- | -- |
| Trumpeter----- | -- | -- | -- | -- | -- |
| Grand total----- | 128,600 | 200,497 | -36 | 346,254 | -63 |

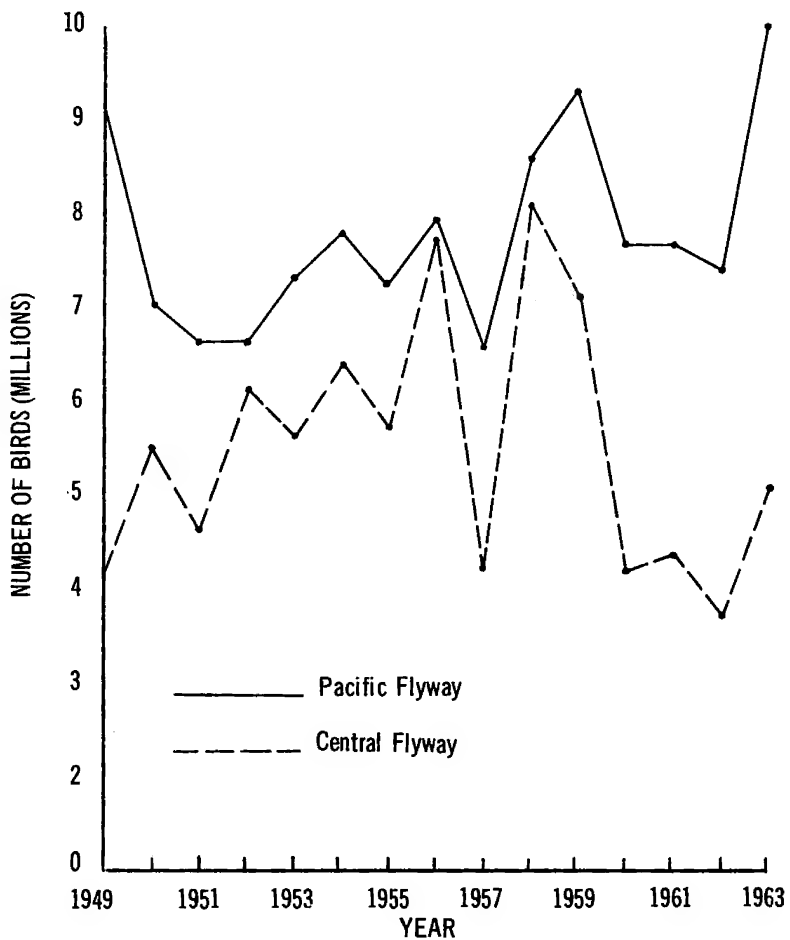


FIGURE C-1.--Trends in numbers of wintering ducks, by Flyways, 1949-63.

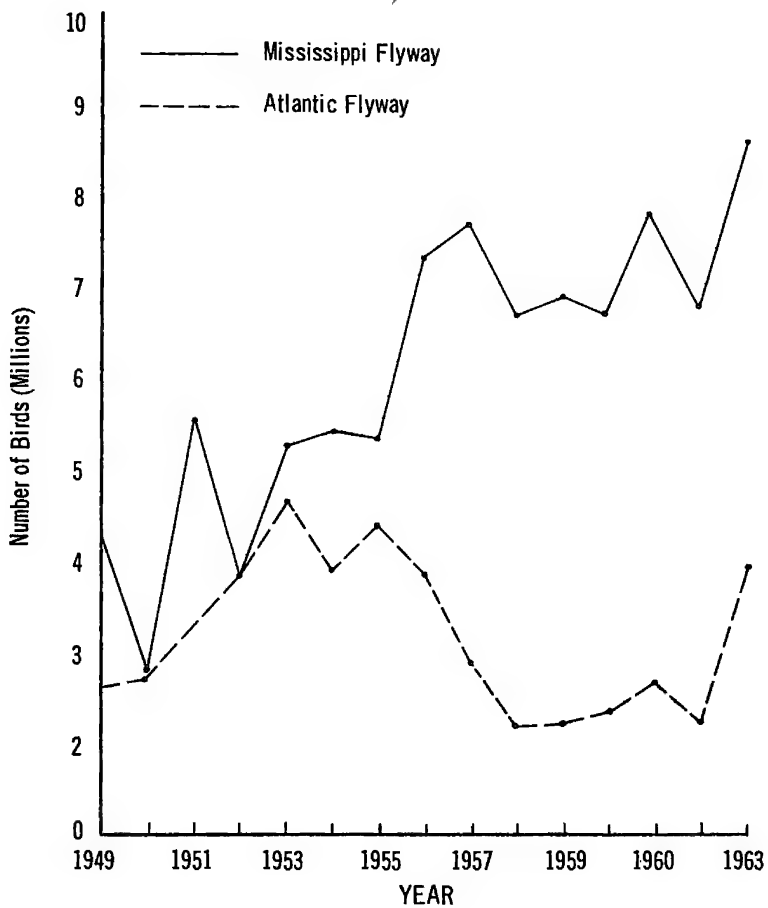


FIGURE C-2.--Trends in numbers of wintering ducks, by Flyways, 1949-63.

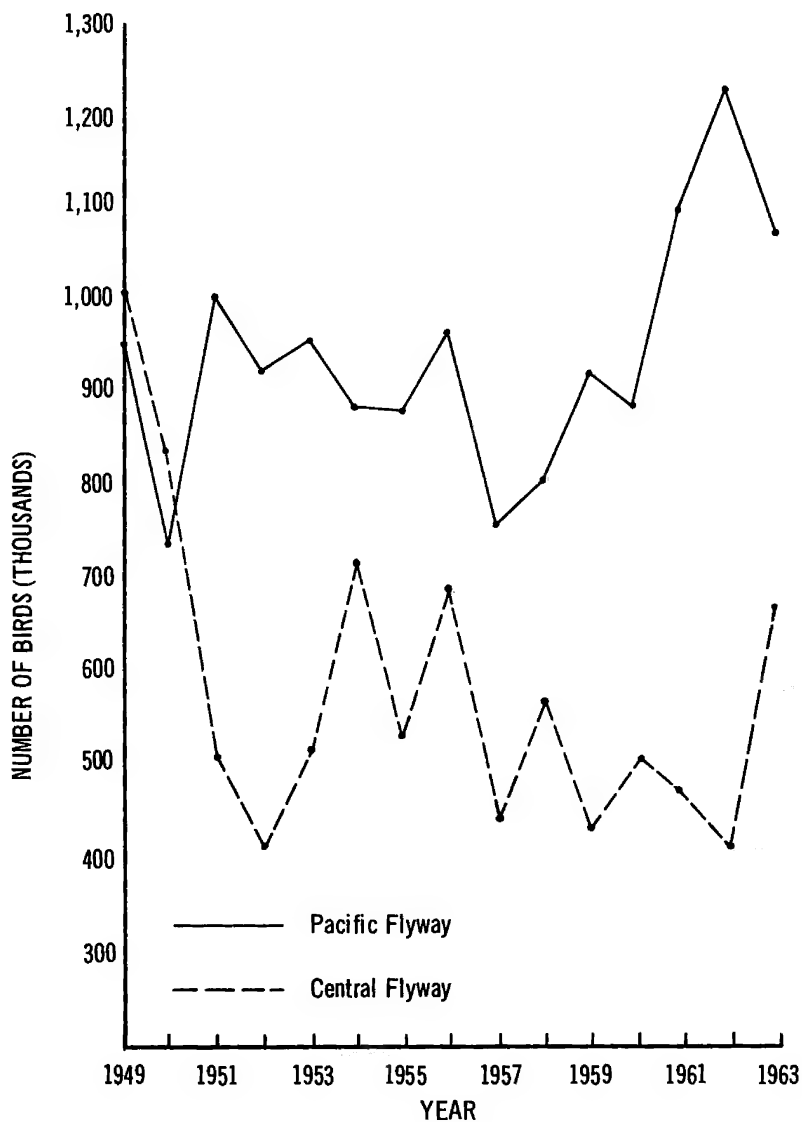


FIGURE C-3.--Trend in numbers of wintering geese, by Flyways, 1949-63.

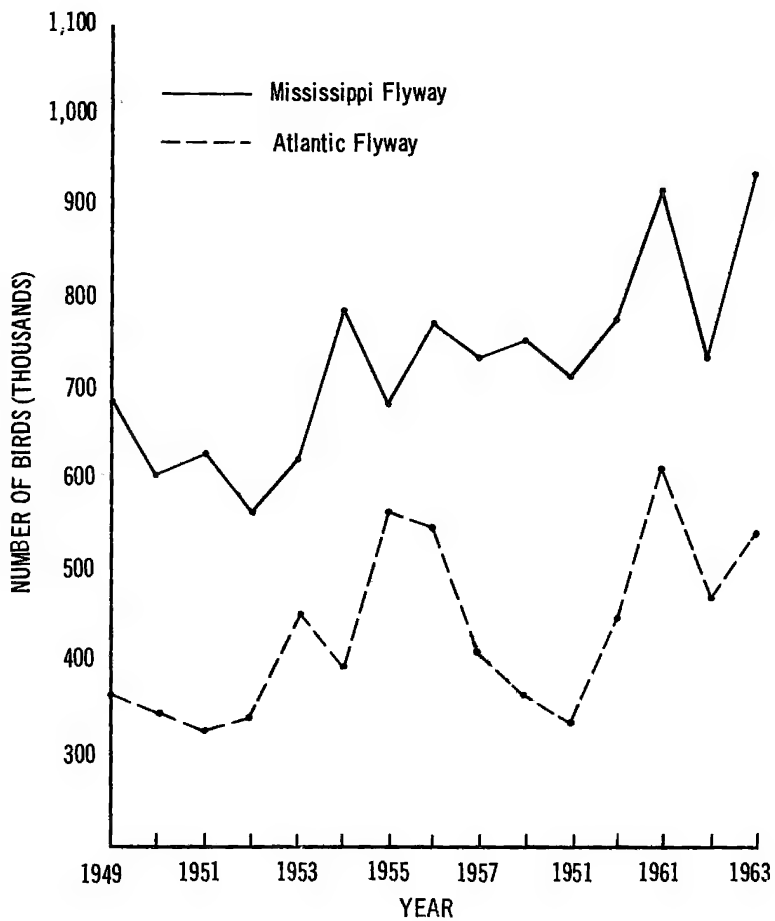


FIGURE C-4.--Trend in numbers of wintering geese, by Flyways, 1949-63.

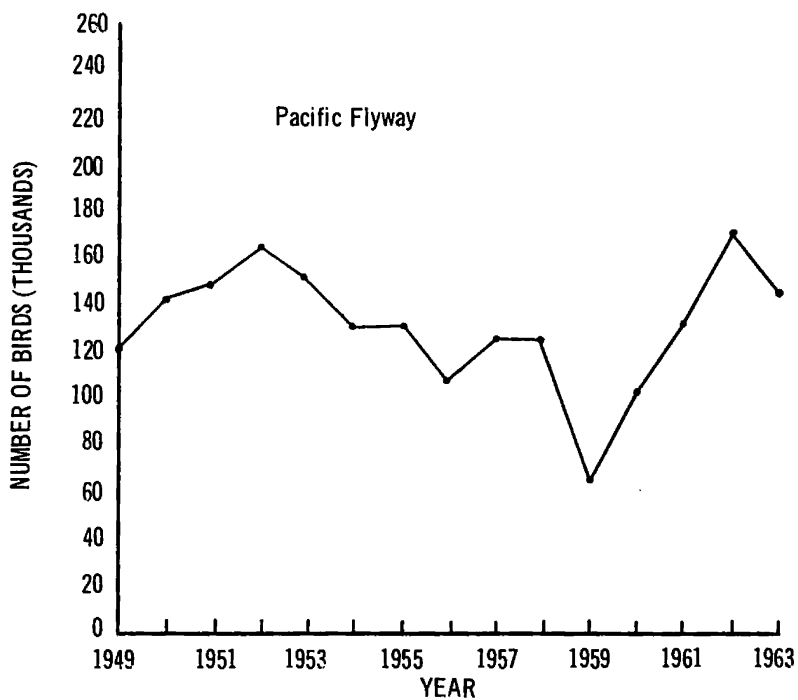


FIGURE C-5.--Trend in numbers of wintering brant, Pacific Flyway, 1949-63.

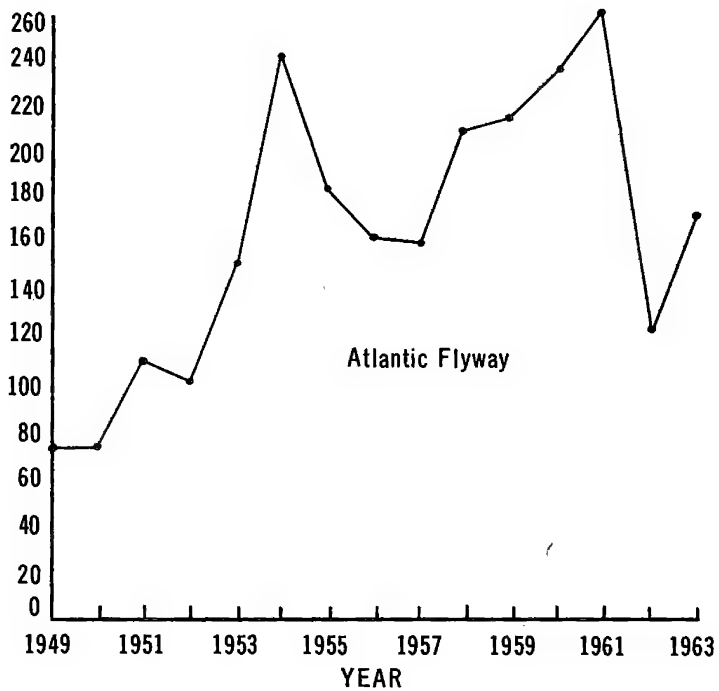


FIGURE C-6.--Trend in numbers of wintering brant, Atlantic Flyway, 1949-63.

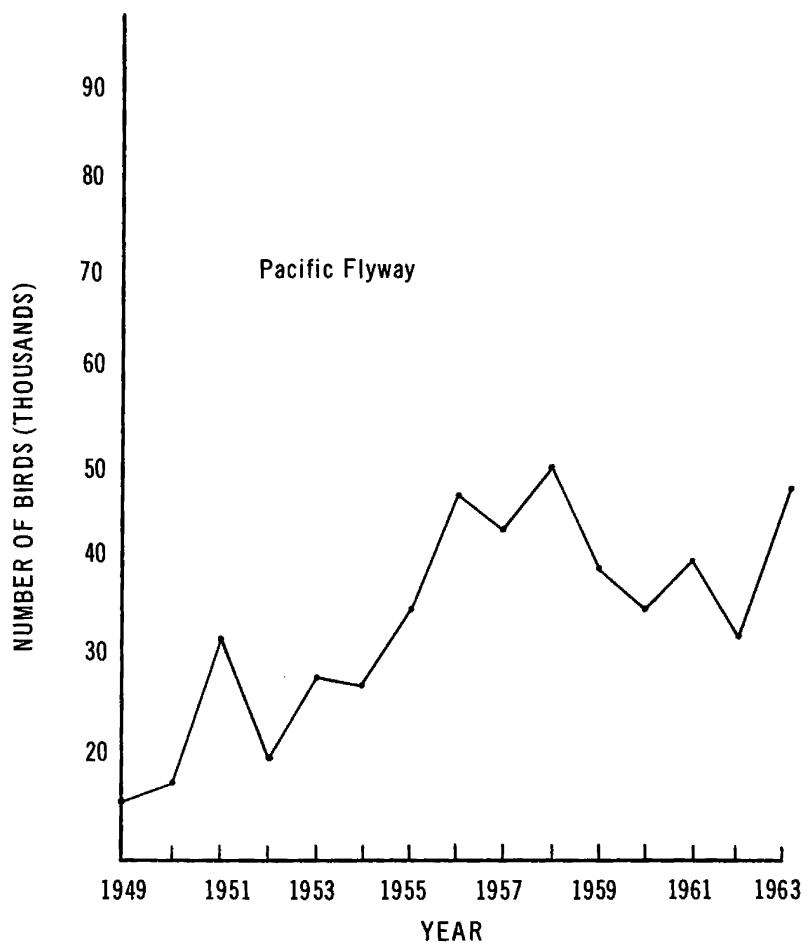
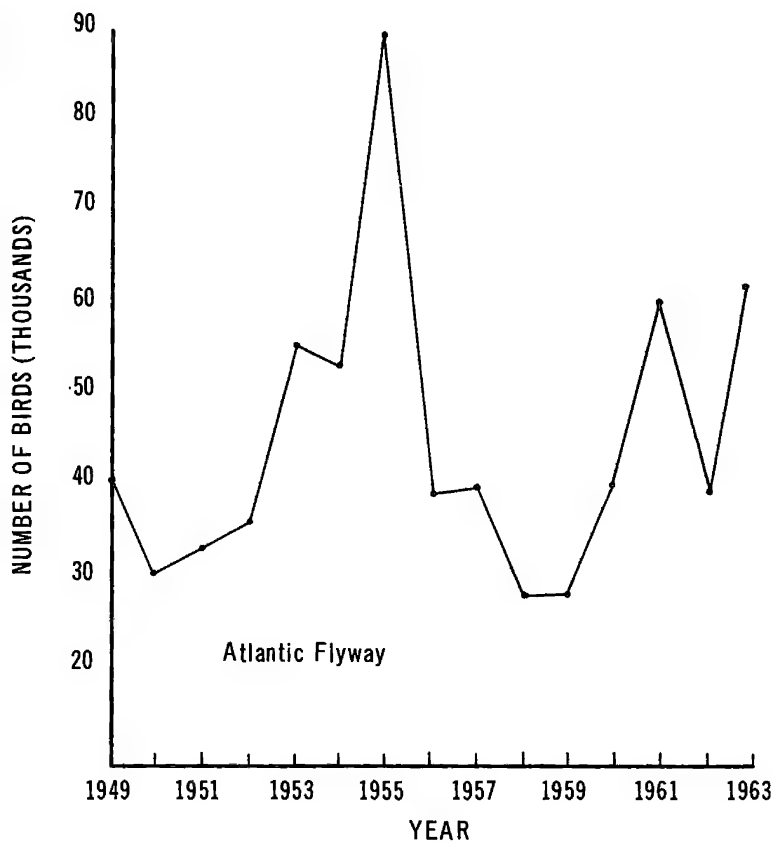


FIGURE C-7.--Trend in numbers of wintering swan, Pacific Flyway, 1949-63.



**FIGURE C-8.--Trend in numbers of wintering swan,
Atlantic Flyway, 1949-63.**

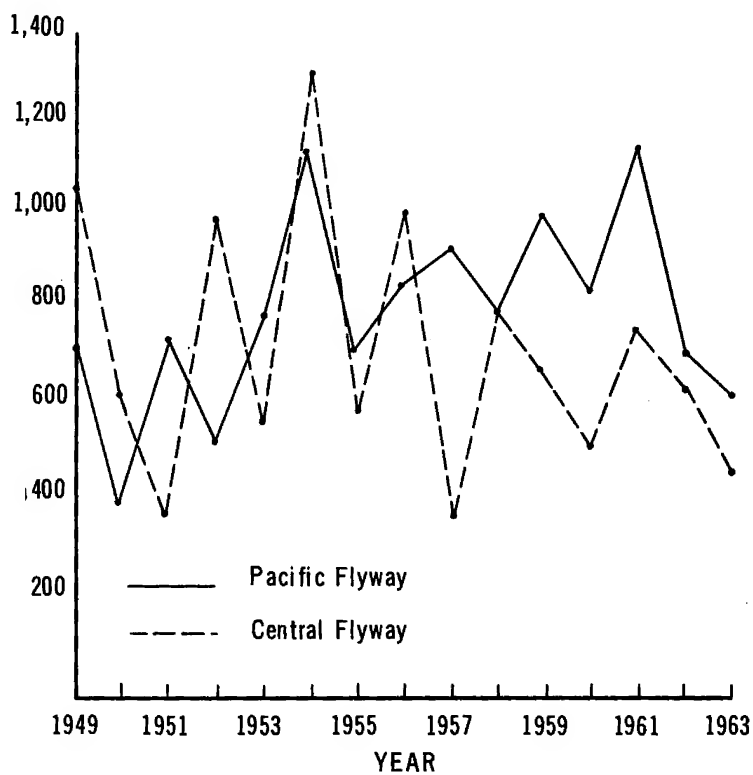


FIGURE C-9.--Trend in numbers of wintering coots, by Flyways, 1949-63.

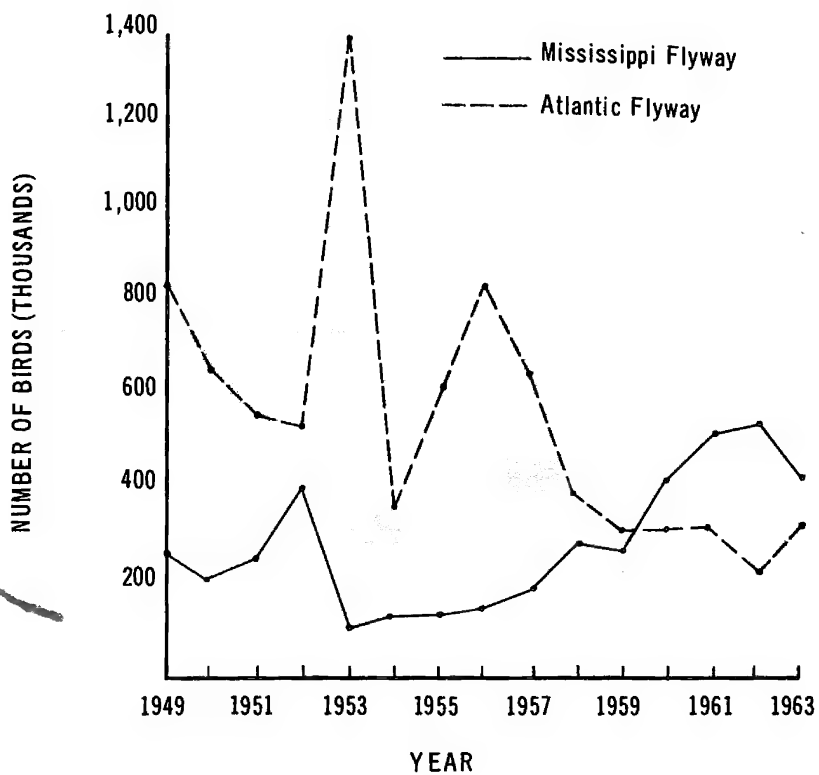


FIGURE C-10.--Trend in numbers of wintering coots, by Flyways, 1949-63.

D. WATER AREA INDEX TABLES

**TABLE D-1.--Long-term trend in May and July pond indexes by strata,
southern Alberta, May and July, 1954-63**

[Index numbers in thousands]

| Year | Stratum | | | Total |
|-----------------------------|---------|-----|-----|-------|
| | A | B | C | |
| May: | | | | |
| 1954----- | 434 | 607 | 122 | 1,163 |
| 1955----- | 405 | 656 | 191 | 1,252 |
| 1956----- | 353 | 598 | 116 | 1,067 |
| 1957----- | 187 | 442 | 82 | 711 |
| 1958----- | 255 | 431 | 120 | 806 |
| 1959----- | 131 | 253 | 120 | 504 |
| 1960----- | 257 | 550 | 193 | 1,000 |
| 1961----- | 191 | 432 | 69 | 692 |
| 1962----- | 118 | 345 | 60 | 523 |
| 1963----- | 170 | 602 | 72 | 844 |
| Average, 1962-63----- | 250 | 492 | 114 | 856 |
| Percent change, 1963 from-- | | | | |
| Average----- | -32 | +22 | -37 | -7 |
| 1962----- | +43 | +74 | +21 | +61 |
| July: | | | | |
| 1954----- | 241 | 400 | 65 | 706 |
| 1955----- | 218 | 339 | 66 | 623 |
| 1956----- | 185 | 420 | 64 | 669 |
| 1957----- | 120 | 288 | 42 | 450 |
| 1958----- | 136 | 282 | 53 | 471 |
| 1959----- | 93 | 140 | 74 | 307 |
| 1960----- | 84 | 262 | 57 | 403 |
| 1961----- | 51 | 153 | 35 | 239 |
| 1962----- | 65 | 257 | 48 | 360 |
| 1963----- | 145 | 471 | 73 | 689 |
| Average, 1962-63----- | 134 | 301 | 58 | 492 |
| Percent change, 1963 from-- | | | | |
| Average----- | +8 | +56 | +26 | +40 |
| 1962----- | +123 | +83 | +54 | +92 |

TABLE D-2.--Long-term trend in May and July pond indexes by strata and comparisons to average and previous year, southern Saskatchewan, 1956-63

| Year | STRATUM | | | | | Total |
|--|---------|--------|--------|--------|--------|---------|
| | A-East | A-West | B-East | B-West | C | |
| May: | | | | | | |
| 1956----- | 754.4 | 700.3 | 644.8 | 284.2 | 105.8 | 2,489.5 |
| 1957----- | 292.3 | 357.9 | 576.2 | 148.5 | 72.2 | 1,447.1 |
| 1958----- | 526.5 | 350.5 | 498.6 | 191.0 | 105.1 | 1,671.7 |
| 1959----- | 157.7 | 334.5 | 160.2 | 57.4 | 73.6 | 783.4 |
| 1960----- | 479.2 | 987.4 | 377.3 | 164.3 | 90.1 | 2,098.3 |
| 1961----- | 48.7 | 171.1 | 221.4 | 92.0 | 55.7 | 588.9 |
| 1962----- | 153.2 | 336.3 | 635.4 | 173.3 | 49.1 | 1,347.3 |
| 1963----- | 239.4 | 256.0 | 293.9 | 131.6 | 39.5 | 960.4 |
| Average 1956 to 1962---- | 344.6 | 462.6 | 444.8 | 158.7 | 78.8 | 1,489.5 |
| Percent change, 1963 from 1962----- | +56.3 | -23.9 | -53.7 | -24.1 | -19.6 | -28.7 |
| Average----- | -30.5 | -44.7 | -33.9 | -17.1 | -49.9 | -35.5 |
| July: | | | | | | |
| 1958----- | 212.8 | 141.8 | 267.4 | 107.1 | 33.8 | 762.9 |
| 1959----- | 143.0 | 120.5 | 145.0 | 36.8 | 26.0 | 471.3 |
| 1960----- | 212.4 | 265.2 | 318.1 | 88.0 | 32.7 | 916.4 |
| 1961----- | 34.4 | 50.6 | 61.2 | 37.1 | 9.8 | 193.1 |
| 1962----- | 75.7 | 61.8 | 68.6 | 26.3 | 13.3 | 245.7 |
| 1963----- | 173.8 | 227.4 | 161.8 | 84.5 | 41.6 | 689.1 |
| Average 1958 to 1962---- | 135.7 | 128.0 | 172.1 | 59.1 | 23.1 | 517.9 |
| Percent change, 1963 from 1962----- | +129.6 | +268.0 | +135.9 | +221.3 | +212.8 | +180.5 |
| Average----- | +28.1 | +77.7 | -6.0 | +43.0 | +80.1 | +33.1 |

TABLE D-3.--Number of water areas per square mile, Montana, 1959-62

| | Sheridan County | Hi-Line | | Great Falls- Piedmont |
|----------------------------------|--------------------|---------|---------|--------------------------|
| | | Eastern | Central | |
| Reservoirs: | | | | |
| 1959----- | 0.43 | 0.64 | 1.10 | 1.22 |
| 1960----- | .35 | .51 | .91 | 1.79 |
| 1961----- | .27 | .55 | 1.09 | .83 |
| 1962----- | .24 | .59 | 1.09 | 1.11 |
| 1963----- | .29 | .72 | 1.13 | .73 |
| Potholes: | | | | |
| 1959----- | 2.64 | .34 | 2.21 | 1.44 |
| 1960----- | 9.09 | 1.10 | 3.19 | 1.14 |
| 1961----- | 4.40 | .43 | .22 | .52 |
| 1962----- | 3.04 | .63 | 1.64 | .30 |
| 1963----- | 7.76 | 1.81 | .95 | .15 |
| Other water areas: | | | | |
| 1959----- | .43 | .88 | .73 | 1.04 |
| 1960----- | .59 | 1.18 | .84 | 1.05 |
| 1961----- | .40 | .98 | .51 | .96 |
| 1962----- | .53 | 1.08 | 1.09 | .59 |
| 1963----- | .56 | .99 | .82 | .66 |
| Total: | | | | |
| 1959----- | 3.50 | 1.86 | 4.04 | 3.69 |
| 1960----- | 10.03 | 2.79 | 4.94 | 3.98 |
| 1961----- | 5.07 | 1.96 | 1.83 | 2.31 |
| 1962----- | 3.81 | 2.30 | 3.82 | 1.79 |
| 1963----- | 8.61 | 3.52 | 2.91 | 1.55 |
| Percent change, 1963 from 1962-- | +126 | +53 | -23 | -13 |

TABLE D-4. --Trend in May and July pond indexes by strata,
North Dakota, South Dakota, and Minnesota, 1959-63

[Index numbers in thousands]

| Year | Stratum | | | Total |
|---------------------------|---------|---------|------|-------|
| | East | Central | West | |
| May: | | | | |
| 1959----- | 162 | 109 | 41 | 313 |
| 1960----- | 223 | 397 | 52 | 672 |
| 1961----- | 151 | 105 | 33 | 289 |
| 1962----- | 313 | 348 | 72 | 732 |
| 1963----- | 375 | 413 | 80 | 868 |
| Average, 1962-63 -- | 344 | 380 | 76 | 801 |
| Percent change, 1963 from | +20 | +19 | +11 | +18 |
| 1962----- | + 9 | + 8 | + 5 | + 8 |
| Average----- | | | | |
| July: | | | | |
| 1959----- | 213 | 110 | 73 | 396 |
| 1960----- | 309 | 311 | 116 | 736 |
| 1961----- | 166 | 108 | 77 | 351 |
| 1962----- | 281 | 231 | 68 | 579 |
| 1963----- | 245 | 275 | 99 | 619 |
| Average, 1962-63 | 263 | 258 | 83 | 599 |
| Percent change, 1963 from | -12 | +19 | +46 | + 7 |
| 1962----- | - 7 | + 8 | +19 | + 3 |
| Average----- | | | | |

Note:--Due to a change in recording water areas in 1962, 1962 July pond index is not comparable to previous counts.

TABLE D-5.--Long-term trend in May and July pond indexes by strata and comparisons to average and previous year, Southern Manitoba, 1963

[Indexes numbers, in thousands]

| Year | S T R A T U M | | TOTAL |
|---------------------------|---------------|-------|-------|
| | A | B | |
| May: | | | |
| 1954----- | 258 | 1,075 | 1,333 |
| 1955----- | 315 | 428 | 743 |
| 1956----- | 391 | 615 | 1,006 |
| 1957----- | 262 | 404 | 666 |
| 1958----- | 352 | 264 | 616 |
| 1959----- | 160 | 482 | 642 |
| 1960----- | 324 | 295 | 619 |
| 1961----- | 158 | 263 | 421 |
| 1962----- | 135 | 295 | 430 |
| 1963----- | 298 | 331 | 629 |
| Average 1954 to 1963----- | 265 | 445 | 710 |
| Percent change, 1963 | | | |
| from 1962----- | +121 | +12 | +46 |
| Average----- | +12 | -26 | -11 |
| July: | | | |
| 1954----- | 473 | 384 | 857 |
| 1955----- | 339 | 271 | 610 |
| 1956----- | 425 | 411 | 836 |
| 1957----- | 241 | 260 | 501 |
| 1958----- | 163 | 341 | 504 |
| 1959----- | 96 | 325 | 420 |
| 1960----- | 164 | 212 | 376 |
| 1961----- | 41 | 86 | 129 |
| 1962----- | 97 | 135 | 232 |
| 1963----- | 145 | 178 | 323 |
| Average 1954 to 1963----- | 218 | 260 | 478 |
| Percent change, 1963 | | | |
| from 1962----- | +49 | +32 | +39 |
| Average----- | -33 | -32 | -32 |

TABLE D-6.--Number of water areas, southwest Manitoba, May, 1961-63

| Area | 1961 ¹ | 1962 | 1963 | Percent change 1962-63 |
|--------------------------|-------------------|-------|-------|------------------------|
| Streams----- | 34 | 37 | 45 | +22 |
| Dugouts----- | 33 | 50 | 46 | - 8 |
| Field water (sheet)----- | 67 | 122 | 221 | +77 |
| Other----- | 769 | 969 | 1,382 | +43 |
| Total----- | 903 | 1,178 | 1,694 | +44 |
| Water areas/sq. mi.----- | 11.9 | 15.1 | 21.7 | -- |

¹ Excludes transect I-3

TABLE D-7.--Number of ponds with water, southern Manitoba, 1960-63

[Index number]

| Block | 1960 | 1961 | 1962 | 1963 | Block | 1960 | 1961 | 1962 | 1963 |
|-------------------------|------|-----------------|------|------|-------|-------|------|-------|-------|
| A | 37 | 31 | 43 | 9 | N | 29 | 14 | 13 | 45 |
| B | 26 | 30 | 41 | 28 | O | 50 | 45 | 36 | 45 |
| C | 57 | 51 | 45 | 58 | P | 50 | 37 | 40 | 47 |
| D | 74 | 81 | 82 | 98 | Q | 74 | 54 | 76 | 70 |
| E | 69 | 56 | 50 | 76 | R | 64 | 40 | 67 | 68 |
| F | 77 | 70 | 70 | 80 | S | 43 | 26 | 61 | 93 |
| G | 42 | 32 | 30 | 40 | T | 33 | 10 | 26 | 33 |
| H | 82 | 42 | 41 | 53 | U | 46 | 27 | 41 | 98 |
| I | 65 | 14 ¹ | 30 | 41 | V | 61 | 41 | 79 | 91 |
| J | 50 | 16 | 8 | 29 | W | 55 | 40 | 48 | 69 |
| K | 85 | 20 | 22 | 124 | X | 53 | 37 | 47 | 66 |
| L | 73 | 12 | 48 | 132 | Y | 77 | 53 | 91 | 113 |
| M | 17 | 15 | 16 | 35 | Z | 29 | 9 | 27 | 35 |
| Total ponds----- | | | | | | 1,414 | 903 | 1,178 | 1,694 |
| Ponds/sq. mi.----- | | | | | | 18.2 | 11.9 | 15.1 | 21.7 |
| Compared with 1961----- | | | | | | 1.57 | 1.00 | 1.30 | 1.69 |

¹ Excludes I-3 transect

E. BREEDING POPULATION SURVEY TABLES

TABLE E-1.--Statistical summary: Alaska waterfowl breeding population survey, 1962 and 1963

| | Stratum | | | | Total |
|--------------------------|---------|---------|---------|---------|-----------|
| | II | III | IV | V | |
| Area (sq. mi.)----- | 15,150 | 42,350 | 17,000 | 1,950 | 76,450 |
| Sample (sq. mi.): | | | | | |
| 1962----- | 152 | 332 | 184 | 72 | 740 |
| 1963----- | 124 | 400 | 172 | 72 | 768 |
| Population index: | | | | | |
| Ducks per square mile: | | | | | |
| 1962----- | 12.7 | 18.9 | 30.0 | 63.6 | 21.3 |
| 1963----- | 9.1 | 16.2 | 28.4 | 50.4 | 17.3 |
| Total ducks: | | | | | |
| 1962----- | 192,000 | 802,500 | 509,900 | 124,100 | 1,628,500 |
| 1963----- | 137,600 | 686,650 | 482,500 | 98,200 | 1,404,950 |
| Game ducks: ¹ | | | | | |
| 1962----- | 177,200 | 619,600 | 406,900 | 119,630 | 1,322,430 |
| 1963----- | 124,115 | 417,950 | 385,500 | 96,420 | 1,123,985 |

¹ Excluding scoter, eider, and oldsquaw.

TABLE E-2.--Whistling swan breeding population indexes, Alaska, 1958-63

| | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|-----------------------------|--------|--------|--------|--------|--------|--------|
| Area sampled (sq. mi.)----- | 640 | 644 | 604 | 648 | 492 | 468 |
| Whistling swan: | | | | | | |
| Number counted----- | 600 | 546 | 710 | 759 | 470 | 567 |
| Population index----- | 63,735 | 58,640 | 79,310 | 79,040 | 55,965 | 64,000 |

TABLE E-3.--Waterfowl breeding population indexes, by species and stratum, Alaska, 1962 and 1963

| Species | Stratum II | | Stratum III | | Stratum IV | | Stratum V | | Total | | Percent change |
|-------------------|------------|---------|-------------|---------|------------|---------|-----------|--------|-----------|-----------|----------------|
| | 1962 | 1963 | 1962 | 1963 | 1962 | 1963 | 1962 | 1963 | 1962 | 1963 | |
| Dabblers: | | | | | | | | | | | |
| Mallard | 16,500 | 13,485 | 20,100 | 43,260 | 10,700 | 14,950 | 13,150 | 11,400 | 60,450 | 83,095 | +37. |
| American widgeon | 5,500 | 2,200 | 14,500 | 7,550 | 17,400 | 9,650 | 4,220 | 2,350 | 41,670 | 21,750 | -48 |
| Green-winged teal | 750 | 825 | 800 | 2,060 | | 500 | | 980 | 1,550 | 4,365 | +180 |
| Shoveler | 1,500 | 825 | 800 | 2,060 | 3,500 | 1,440 | 1,240 | 1,180 | 7,040 | 5,505 | -22 |
| Pintail | 95,000 | 30,825 | 221,500 | 209,450 | 135,700 | 113,400 | 23,700 | 24,950 | 475,900 | 378,625 | -20 |
| Subtotal | 119,250 | 48,160 | 257,700 | 264,380 | 167,300 | 139,940 | 42,310 | 40,860 | 586,610 | 493,340 | -15 |
| Divers: | | | | | | | | | | | |
| Redhead | | | | | | | | 300 | | 300 | |
| Canvasback | | | 2,400 | 2,060 | 3,000 | 13,500 | 1,240 | 2,450 | 6,640 | 18,010 | +171 |
| Scaup | 43,550 | 63,985 | 325,700 | 239,850 | 223,400 | 221,450 | 64,540 | 46,650 | 657,190 | 571,935 | -13 |
| Goldeneye | 6,350 | 2,200 | 20,100 | 4,110 | 2,500 | 960 | 3,600 | 1,360 | 32,550 | 8,630 | -73 |
| Bufflehead | 7,100 | 9,770 | 13,700 | 7,550 | 10,700 | 9,650 | 7,320 | 4,800 | 38,820 | 31,770 | -18 |
| Subtotal | 57,000 | 75,955 | 361,900 | 253,570 | 239,600 | 245,560 | 76,700 | 55,560 | 735,200 | 630,645 | -14 |
| Miscellaneous: | | | | | | | | | | | |
| Scoter | 14,950 | 13,485 | 138,700 | 104,800 | 66,800 | 44,400 | 4,470 | 1,180 | 224,920 | 163,865 | -27 |
| Eider | | | | 3,450 | 10,700 | 8,700 | | | 10,700 | 12,150 | +13 |
| Oldsquaw | | | 44,200 | 60,450 | 25,000 | 43,900 | | 300 | 69,200 | 104,650 | +51 |
| Merganser | | | | | | | | 300 | | 300 | |
| Subtotal | 14,950 | 13,485 | 182,900 | 168,700 | 102,500 | 97,000 | 4,470 | 1,780 | 304,820 | 280,965 | - 8 |
| Total | 191,200 | 137,600 | 802,500 | 686,650 | 509,400 | 482,500 | 123,480 | 98,200 | 1,626,630 | 1,404,950 | -14 |

TABLE E-4.--Waterfowl breeding population indexes in northern Alberta, northeastern British Columbia, Northwest Territories, and Yukon, 1962 and 1963

| Species | Stratum | | | | | | |
|-------------------------|----------------|----------------|---------------|----------------|----------------|----------------|----------------|
| | 1.1 | 1.2 | 2 | 3 | 4 | 5 | 6 |
| Ducks: | | | | | | | |
| Dabblers: | | | | | | | |
| Mallard----- | 261,100 | 129,500 | 22,400 | 62,000 | 21,300 | 44,500 | 20,500 |
| Gadwall----- | 5,000 | -- | -- | -- | -- | -- | -- |
| American widgeon--- | 33,300 | 18,300 | 2,100 | 18,600 | 5,600 | 18,900 | 6,600 |
| Green-winged teal--- | 10,000 | 42,000 | 900 | 18,600 | 7,100 | 27,000 | 6,600 |
| Blue-winged teal--- | 49,900 | 2,900 | 500 | -- | -- | -- | -- |
| Shoveler----- | 24,900 | 2,900 | 2,300 | 1,200 | -- | 13,400 | 600 |
| Pintail----- | 34,100 | 9,600 | 9,800 | 18,600 | 10,200 | 9,400 | 2,400 |
| Subtotal----- | 418,300 | 205,200 | 38,000 | 119,000 | 44,200 | 113,200 | 36,700 |
| Divers: | | | | | | | |
| Redhead----- | 27,400 | 1,200 | 2,500 | -- | -- | 1,300 | -- |
| Canvasback----- | 24,100 | 2,900 | 5,900 | 24,800 | -- | -- | -- |
| Scaup----- | 212,000 | 113,600 | 13,100 | 347,300 | 195,800 | 41,700 | 82,200 |
| Ring-necked duck--- | 10,800 | 9,600 | 800 | 12,600 | 4,100 | 2,600 | 5,500 |
| Goldeneye----- | 800 | 1,200 | 1,900 | 1,200 | 1,900 | -- | -- |
| Bufflehead----- | 44,100 | 58,800 | 1,700 | 6,200 | -- | 1,300 | 1,100 |
| Ruddy duck----- | 10,000 | -- | 400 | -- | -- | 4,000 | -- |
| Subtotal----- | 329,200 | 187,300 | 26,300 | 392,100 | 201,800 | 50,900 | 88,800 |
| Miscellaneous: | | | | | | | |
| Scoter and eider--- | 79,000 | 23,700 | -- | 93,000 | 81,200 | 1,300 | 1,100 |
| Oldsquaw----- | -- | -- | -- | 3,700 | 14,200 | -- | -- |
| Merganser----- | 5,000 | -- | 2,500 | 12,400 | 32,900 | -- | -- |
| Subtotal----- | 84,000 | 23,700 | 2,500 | 109,100 | 128,300 | 1,300 | 1,100 |
| Total ducks----- | 831,500 | 416,200 | 66,800 | 620,200 | 374,300 | 165,400 | 126,600 |
| Coots----- | 21,400 | -- | 3,500 | -- | -- | -- | -- |
| Geese: | | | | | | | |
| White-fronted----- | -- | -- | -- | -- | -- | -- | -- |
| Canada----- | 6,700 | 1,400 | 800 | 17,400 | 27,100 | 1,300 | -- |
| Swan----- | -- | -- | -- | -- | -- | -- | -- |

TABLE E-4. --Waterfowl breeding population indexes in northern Alberta, northeastern British Columbia, Northwest Territories, and Yukon, 1962 and 1963. --Continued

| Species | Stratum | | | | Total | | Percent change from 1962 |
|---------------------|---------|---------|---------|--------|-----------|-----------|--------------------------|
| | 7 | 8 | 9 | 10 | 1962 | 1963 | |
| Ducks: | | | | | | | |
| Dabblers: | | | | | | | |
| Mallard----- | 41,700 | 12,300 | 5,800 | 1,500 | 568,400 | 622,600 | +10 |
| Gadwall----- | -- | -- | -- | -- | 5,600 | 5,000 | -11 |
| American widgeon--- | 25,500 | 16,000 | 4,500 | 7,000 | 182,200 | 156,400 | -14 |
| Green-winged teal-- | 3,900 | 500 | | | 60,300 | 116,600 | +93 |
| Blue-winged teal--- | -- | -- | -- | -- | 40,800 | 53,300 | +31 |
| Shoveler----- | 700 | 300 | -- | 400 | 70,700 | 46,700 | -34 |
| Pintail----- | 20,100 | 16,200 | 15,500 | 10,400 | 182,800 | 156,300 | -15 |
| Subtotal----- | 91,900 | 45,300 | 25,800 | 19,300 | 1,110,800 | 1,156,900 | +6 |
| Divers: | | | | | | | |
| Redhead----- | -- | -- | -- | -- | 53,600 | 32,400 | -40 |
| Canvasback----- | 800 | 7,700 | -- | 700 | 18,700 | 66,900 | +258 |
| Scaup----- | 392,400 | 57,900 | 59,000 | 23,500 | 1,391,000 | 1,538,500 | +11 |
| Ring-necked duck--- | -- | -- | -- | -- | 41,400 | 46,000 | +11 |
| Goldeneye----- | 2,300 | 800 | -- | 3,000 | 86,400 | 13,100 | -85 |
| Bufflehead----- | -- | -- | -- | -- | 172,400 | 113,200 | -34 |
| Ruddy duck----- | -- | -- | -- | -- | 1,900 | 14,400 | +658 |
| Subtotal----- | 395,500 | 66,400 | 59,000 | 27,200 | 1,765,400 | 1,824,500 | |
| Miscellaneous: | | | | | | | |
| Scoter and eider--- | 227,100 | 17,800 | 46,100 | 31,700 | 577,300 | 602,000 | +4 |
| Oldsquaw----- | 42,500 | 1,600 | 15,400 | 3,800 | 144,500 | 81,200 | -44 |
| Merganser----- | 15,400 | 4,100 | 9,500 | 3,200 | 62,100 | 85,000 | +37 |
| Subtotal----- | 285,000 | 23,500 | 71,000 | 38,700 | 783,900 | 768,200 | -2 |
| Total ducks----- | 772,400 | 135,200 | 155,800 | 85,200 | 3,660,100 | 3,749,600 | +2 |
| Coots----- | -- | -- | -- | -- | 16,400 | 24,900 | +52 |
| Geese: | | | | | | | |
| White-fronted----- | -- | -- | 1,300 | 100 | 6,200 | 1,400 | -77 |
| Canada----- | 2,100 | -- | 2,900 | 300 | 25,500 | 60,000 | +135 |
| Swan----- | 14,100 | 4,100 | 13,500 | 400 | 26,500 | 32,100 | +21 |

TABLE E-5.--Waterfowl breeding population indexes in northern Alberta, northeastern British Columbia, Northwest Territories, and Yukon, 1956-1963

| Species | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|-------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Ducks: | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 466,000 | 498,400 | 776,900 | 1,254,700 | 417,800 | 1,090,400 | 568,400 | 622,600 |
| Gadwall----- | -- | 2,600 | 1,700 | 2,700 | 1,880 | 4,500 | 5,600 | 5,000 |
| American widgeon--- | 301,100 | 261,500 | 205,000 | 426,700 | 329,400 | 345,800 | 182,200 | 156,400 |
| Green-winged teal-- | 107,600 | 70,400 | 122,200 | 281,100 | 144,040 | 152,100 | 60,300 | 116,600 |
| Blue-winged teal--- | 9,000 | 6,200 | 47,700 | 105,300 | 65,450 | 90,200 | 40,800 | 53,300 |
| Shoveler----- | 41,800 | 42,700 | 100,300 | 187,600 | 77,320 | 156,900 | 70,700 | 46,700 |
| Pintail----- | 277,700 | 302,300 | 453,200 | 1,002,500 | 352,980 | 522,000 | 182,800 | 156,300 |
| Subtotal----- | 1,203,200 | 1,184,100 | 1,707,000 | 3,260,600 | 1,388,870 | 2,361,900 | 1,110,800 | 1,156,900 |
| Divers: | | | | | | | | |
| Redhead----- | 22,000 | 25,000 | 13,900 | 77,800 | 29,420 | 31,900 | 53,600 | 32,400 |
| Canvasback----- | 20,800 | 18,500 | 80,900 | 60,900 | 52,330 | 28,100 | 18,700 | 66,900 |
| Scaup----- | 1,219,100 | 1,120,300 | 1,304,800 | 2,055,800 | 1,448,190 | 1,682,300 | 1,391,000 | 1,538,500 |
| Ring-necked duck--- | 54,800 | 40,400 | 42,400 | 130,700 | 76,410 | 60,000 | 41,400 | 46,000 |
| Goldeneye----- | 32,900 | 57,300 | 233,900 | 245,400 | 50,210 | 157,800 | 86,400 | 13,100 |
| Bufflehead----- | 120,700 | 92,500 | 120,700 | 206,000 | 159,330 | 141,800 | 172,400 | 113,200 |
| Ruddy duck----- | -- | 6,200 | 12,700 | 27,100 | 8,650 | 10,500 | 1,900 | 14,400 |
| Subtotal----- | 1,470,300 | 1,360,200 | 1,809,300 | 2,803,700 | 1,824,540 | 2,112,400 | 1,765,400 | 1,824,500 |
| Miscellaneous: | | | | | | | | |
| Scoter----- | 812,200 | 859,400 | 752,000 | 1,299,700 | 1,266,540 | 1,065,600 | 577,300 | 602,000 |
| Oldsquaw----- | 130,100 | 105,400 | 207,300 | 284,800 | 187,800 | 211,800 | 144,500 | 81,200 |
| Merganser----- | 169,700 | 179,600 | 155,400 | 145,900 | 130,170 | 142,100 | 62,100 | 85,000 |
| Subtotal----- | 1,112,000 | 1,144,400 | 1,114,700 | 1,730,400 | 1,584,510 | 1,419,500 | 783,900 | 768,200 |
| Total ducks----- | 3,785,500 | 3,688,700 | 4,631,000 | 7,794,700 | 4,797,920 | 5,893,800 | 3,660,100 | 3,749,600 |
| Coots----- | ? | ? | ? | ? | 24,300 | 25,000 | 16,400 | 24,900 |
| Geese: | | | | | | | | |
| Canada----- | 63,300 | 21,000 | 52,400 | 93,300 | 45,300 | 39,700 | 25,500 | 60,000 |
| White-fronted----- | 7,800 | 7,800 | 800 | 10,000 | 7,200 | 8,700 | 6,200 | 1,400 |
| Swan----- | 15,050 | 11,400 | 13,300 | 45,400 | 23,600 | 29,600 | 26,500 | 32,100 |

TABLE E-6.--Ten-year trend in waterfowl breeding population indices by species,
southern Alberta, May, 1954-63

[Index numbers in thousands]

| Species | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 ¹ |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------|
| Ducks: | | | | | | | | | | |
| Dabblers: | | | | | | | | | | |
| Mallard----- | 879 | 470 | 903 | 1,038 | 1,194 | 1,295 | 947 | 848 | 730 | 739 |
| Gadwall----- | 60 | 62 | 85 | 61 | 79 | 127 | 140 | 109 | 88 | 84 |
| American widgeon----- | 177 | 177 | 157 | 157 | 179 | 254 | 221 | 187 | 127 | 133 |
| Green-winged teal----- | 63 | 55 | 27 | 31 | 34 | 72 | 55 | 64 | 14 | 15 |
| Blue-winged teal----- | 174 | 217 | 134 | 134 | 174 | 189 | 165 | 169 | 60 | 60 |
| Shoveler----- | 174 | 172 | 171 | 155 | 217 | 204 | 238 | 167 | 123 | 188 |
| Pintail----- | 677 | 784 | 707 | 595 | 651 | 568 | 620 | 284 | 239 | 347 |
| Subtotal----- | 2,204 | 2,437 | 2,184 | 2,171 | 2,528 | 2,710 | 2,436 | 1,828 | 1,381 | 1,566 |
| Divers: | | | | | | | | | | |
| Redhead----- | 48 | 60 | 59 | 45 | 63 | 57 | 40 | 40 | 21 | 38 |
| Canvasback----- | 52 | 48 | 53 | 54 | 94 | 52 | 40 | 37 | 38 | 49 |
| Scaup----- | 199 | 249 | 269 | 329 | 309 | 326 | 249 | 249 | 216 | 261 |
| Ring-necked duck----- | -- | Tr. | 4 | -- | 1 | 4 | 2 | 2 | 1 | Tr. |
| Goldeneye----- | 4 | 5 | 6 | 5 | 3 | 3 | 3 | 3 | 2 | 1 |
| Bufflehead----- | 13 | 13 | 16 | 17 | 21 | 27 | 22 | 32 | 12 | 14 |
| Ruddy----- | 13 | 21 | 20 | 12 | 16 | 33 | 32 | 19 | 21 | 10 |
| Subtotal----- | 329 | 396 | 425 | 460 | 507 | 506 | 388 | 382 | 311 | 373 |
| Miscellaneous: | | | | | | | | | | |
| Scoter----- | -- | -- | 41 | 26 | 36 | 56 | 35 | 43 | 47 | 17 |
| Total ducks----- | 2,533 | 2,833 | 2,650 | 2,657 | 3,067 | 3,268 | 2,859 | 2,253 | 1,739 | 1,956 |
| Geese: | | | | | | | | | | |
| Canada goose----- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2 |
| Coots----- | 168 | 100 | 81 | 44 | 74 | 131 | 88 | 97 | 23 | 61 |
| Grand total----- | 2,701 | 2,933 | 2,731 | 2,701 | 3,141 | 3,399 | 2,947 | 2,350 | 1,762 | 2,019 |

¹ Canada geese included only in 1963

TABLE E-7.--Comparative status of waterfowl breeding population indexes by species and stratum, southern Alberta, May, 1962 and 1963

[Index numbers in thousands]

| Species | Stratum | | | Total | | Average 1952 to 1963 | Percent change from: 1962 | |
|------------------------|---------|-------|-------|-------|-------|----------------------------|---------------------------------|---------|
| | A | B | C | 1962 | 1963 | | 1962 | Average |
| Ducks: | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 179 | 484 | 76 | 730 | 739 | 922 | +1 | -20 |
| Gadwall----- | 27 | 51 | 7 | 88 | 85 | 83 | -3 | +2 |
| American widgeon----- | 27 | 94 | 12 | 127 | 133 | 172 | +5 | -23 |
| Green-winged teal----- | 1 | 13 | 1 | 14 | 15 | 40 | +7 | -63 |
| Blue-winged teal----- | 10 | 48 | 2 | 60 | 60 | 135 | NC | -56 |
| Shoveler----- | 52 | 127 | 9 | 123 | 188 | 173 | +53 | +9 |
| Pintail----- | 129 | 170 | 49 | 239 | 348 | 593 | +46 | -41 |
| Subtotal----- | 425 | 987 | 156 | 1,381 | 1,568 | 2,118 | +14 | -26 |
| Divers: | | | | | | | | |
| Redhead----- | 5 | 33 | -- | 21 | 38 | 47 | +78 | -19 |
| Canvasback----- | 1 | 48 | -- | 38 | 49 | 50 | +28 | -2 |
| Scaup----- | 52 | 186 | 23 | 216 | 261 | 243 | +21 | +8 |
| Ring-necked duck----- | Trace | Trace | -- | 1 | Trace | 1 | -- | -- |
| Goldeneye----- | -- | 1 | -- | 2 | 1 | 3 | -37 | -67 |
| Bufflehead----- | Trace | 14 | Trace | 12 | 14 | 18 | +22 | -20 |
| Ruddy----- | 1 | 6 | 3 | 21 | 10 | 19 | -52 | -47 |
| Subtotal----- | 59 | 288 | 26 | 311 | 373 | 381 | +20 | -2 |
| Miscellaneous: | | | | | | | | |
| Scoter----- | -- | 17 | -- | 47 | 17 | 36 | -65 | -54 |
| Total ducks----- | 484 | 1,292 | 182 | 1,739 | 1,958 | 2,535 | +13 | -23 |
| Geese: | | | | | | | | |
| Canada goose----- | 2 | Trace | Trace | 5 | 2 | (1) | -- | -- |
| Coots----- | 11 | 50 | -- | 23 | 61 | 87 | +165 | -30 |
| Grand total----- | 497 | 1,342 | 182 | 1,767 | 2,021 | 2,622 | +14 | -23 |

¹ Not calculated at this time.

TABLE E-8.--Lone drake index long-term trend expressed as percentage of total drakes, southern Alberta, 1954-63

| Year | Mallard | Pintails | Canvasback |
|-----------|---------|----------|------------|
| 1954----- | 71.49 | 72.30 | 42.50 |
| 1955----- | 77.30 | 81.16 | 67.37 |
| 1956----- | 84.60 | 85.09 | 63.12 |
| 1957----- | 92.03 | 88.82 | 81.60 |
| 1958----- | 85.80 | 84.34 | 75.47 |
| 1959----- | 70.66 | 73.26 | 42.84 |
| 1960----- | 84.92 | 82.02 | 72.04 |
| 1961----- | 77.10 | 74.22 | 63.89 |
| 1962----- | 82.39 | 83.98 | 54.32 |
| 1963----- | 85.44 | 85.44 | 81.27 |

TABLE E-9.--Aerial waterfowl breeding-pair count on key production areas, Nevada, 1959-63

| Species | Total | | | | |
|--------------------|-------|-------|-------|-------|-------|
| | 1959 | 1960 | 1961 | 1962 | 1963 |
| Ducks: | | | | | |
| Dabblers: | | | | | |
| Mallard----- | 1,500 | 963 | 913 | 715 | 896 |
| Gadwall----- | 1,015 | 380 | 398 | 383 | 631 |
| Cinnamon teal----- | 1,970 | 485 | 422 | 588 | 808 |
| Shoveler----- | 84 | 165 | 101 | 63 | 91 |
| Pintails----- | 336 | 231 | 292 | 241 | 360 |
| Subtotal----- | 4,905 | 2,224 | 2,126 | 1,990 | 2,786 |
| Divers: | | | | | |
| Redhead----- | 2,742 | 942 | 612 | 663 | 1,242 |
| Canvasback----- | 100 | 275 | 204 | 75 | 125 |
| Ruddy duck----- | 430 | 204 | 108 | 100 | 268 |
| Subtotal----- | 3,272 | 1,421 | 924 | 838 | 1,635 |
| Unidentified----- | 52 | 178 | 117 | 116 | 75 |
| Total ducks----- | 8,229 | 3,823 | 3,167 | 2,944 | 4,496 |
| Canada goose----- | 396 | 418 | 363 | 461 | 457 |

TABLE E-10.--Trend in duck numbers, Utah, 1957-63

| | Route flown | | | | | | Total |
|--|---------------------|-----------------|-----------------|-----------------------|---------------------|----------------|-------|
| | Box Elder County | Weber County | Davis County | Jordan River Clubs | Salt Lake County | Utah County | |
| Area sampled (sq. mi.)----- | 48.0 | 15.5 | 14.2 | 6.2 | 6.7 | 18.0 | 108.6 |
| Ducks: | | | | | | | |
| Number counted: | | | | | | | |
| 1957----- | 962 | 416 | 313 | 402 | 64 | 113 | 2,270 |
| 1958----- | 2,070 | 483 | 342 | 400 | 76 | 284 | 3,655 |
| 1959----- | 1,671 | 573 | 466 | 488 | 55 | 231 | 3,484 |
| 1960----- | 2,458 | 766 | 791 | 646 | 76 | 515 | 5,252 |
| 1961----- | 2,119 | 732 | 478 | 320 | 29 | 864 | 4,542 |
| 1962----- | 1,931 | 843 | 583 | 503 | 28 | 286 | 4,174 |
| 1963----- | 2,076 | 1,039 | 1,160 | 710 | 69 | 464 | 5,518 |
| Number per square mile: | | | | | | | |
| 1957----- | 20.0 | 26.8 | 22.0 | 64.8 | 9.6 | 6.3 | 20.9 |
| 1958----- | 43.1 | 31.8 | 24.1 | 64.5 | 11.3 | 15.7 | 33.7 |
| 1959----- | 34.8 | 37.0 | 32.8 | 78.7 | 8.2 | 12.8 | 32.1 |
| 1960----- | 51.2 | 49.4 | 55.7 | 104.2 | 11.3 | 28.6 | 48.0 |
| 1961----- | 44.1 | 47.2 | 33.7 | 51.6 | 4.3 | 48.0 | 41.8 |
| 1962----- | 40.2 | 54.4 | 41.1 | 81.1 | 4.2 | 15.9 | 38.4 |
| 1963----- | 43.3 | 67.0 | 81.7 | 114.5 | 10.3 | 25.8 | 50.8 |
| Percent change, 1963 from 1962----- | +8 | +23 | +99 | +41 | +145 | +62 | +32 |

TABLE E-11.--Trends in dike line breeding pair counts of waterfowl on four State refuges, Utah, 1958-63

| Species | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|------------------------|-------|-------|-------|-------|-------|-------|
| Ducks: | | | | | | |
| Dabblers: | | | | | | |
| Mallard----- | 739 | 696 | 910 | 855 | 731 | 783 |
| Gadwall----- | 331 | 316 | 407 | 426 | 493 | 673 |
| American widgeon----- | 5 | 12 | 2 | 16 | 19 | 6 |
| Green-winged teal----- | 23 | 32 | 13 | 70 | 50 | 24 |
| Blue-winged teal----- | 78 | 95 | 119 | 52 | 53 | 52 |
| Cinnamon teal----- | 540 | 607 | 830 | 700 | 637 | 863 |
| Shoveler----- | 294 | 289 | 428 | 314 | 418 | 635 |
| Pintail----- | 527 | 459 | 516 | 453 | 469 | 528 |
| Subtotal----- | 2,537 | 2,506 | 3,225 | 2,886 | 2,870 | 3,564 |
| Divers: | | | | | | |
| Redhead----- | 930 | 1,056 | 1,283 | 1,183 | 1,556 | 1,590 |
| Canvasback----- | -- | 1 | -- | -- | 1 | 2 |
| Scaup----- | 3 | 9 | 2 | 20 | 38 | 15 |
| Goldeneye----- | -- | -- | -- | -- | 1 | -- |
| Bufflehead----- | 1 | 4 | -- | -- | -- | 1 |
| Ruddy duck----- | 192 | 272 | 329 | 290 | 295 | 328 |
| Subtotal----- | 1,126 | 1,342 | 1,614 | 1,493 | 1,891 | 1,936 |
| Total ducks----- | 3,663 | 3,848 | 4,389 | 4,379 | 4,761 | 5,500 |
| Canada goose----- | 157 | 147 | 152 | 161 | 160 | 187 |

TABLE E-12.--Percentage species composition of breeding populations of waterfowl, Utah, 1959-1963

| Species | Northern area | | | | | Southern area | | | | |
|-----------------------|---------------|-------|-------|----------|-------|---------------|-------|-------|----------|----------|
| | 1959 | 1960 | 1961 | 1962 | 1963 | 1959 | 1960 | 1961 | 1962 | 1963 |
| Ducks: | | | | | | | | | | |
| Dabblers: | | | | | | | | | | |
| Mallard----- | 16.8 | 17.4 | 20.6 | 15.1 | 14.2 | 23.0 | 26.2 | 17.3 | 16.8 | 22.2 |
| Gadwall----- | 7.6 | 8.3 | 10.7 | 10.2 | 12.0 | 7.3 | 7.1 | 7.2 | 7.6 | 10.8 |
| American widgeon----- | 0.3 | 0.1 | 0.2 | 0.3 | 0.3 | 1.3 | 0.5 | 0.8 | 1.0 | 1.5 |
| Green-winged teal--- | 1.1 | 0.3 | 0.7 | 0.6 | 0.5 | 2.3 | 3.6 | 8.5 | 6.9 | 2.0 |
| Blue-winged teal--- | 2.3 | 2.5 | 1.2 | 0.9 | 1.0 | 1.9 | 1.3 | 1.0 | 1.1 | 0.9 |
| Shoveler----- | 6.9 | 8.3 | 7.7 | 8.5 | 10.9 | 6.6 | 5.7 | 3.7 | 6.5 | 7.8 |
| Pintail----- | 11.8 | 10.8 | 9.3 | 9.7 | 8.5 | 16.8 | 12.2 | 11.1 | 14.8 | 16.1 |
| Divers: | | | | | | | | | | |
| Redhead----- | 30.2 | 27.1 | 28.6 | 35.1 | 31.3 | 19.6 | 22.1 | 26.3 | 22.6 | 17.1 |
| Canvasback----- | (1 obs.) | -- | -- | (1 obs.) | 0.2 | -- | -- | -- | -- | (1 obs.) |
| Scaup----- | 0.1 | 0.1 | 0.1 | 0.9 | 0.4 | 1.2 | 0.8 | 2.8 | 2.7 | 1.6 |
| Ring-necked duck--- | -- | -- | -- | -- | -- | -- | 0.2 | -- | -- | -- |
| Goldeneye----- | -- | -- | -- | (1 obs.) | -- | -- | -- | -- | (1 obs.) | -- |
| Bufflehead----- | 0.1 | -- | -- | -- | -- | 0.2 | -- | -- | -- | 0.2 |
| Ruddy duck----- | 7.6 | 8.9 | 6.2 | 5.7 | 5.9 | 7.5 | 4.9 | 6.3 | 8.8 | 8.1 |
| Total----- | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

TABLE E-13. --Aerial counts of Canada goose breeding pairs and grouped birds, Idaho, 1957-1963

| Area | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|--|-------|-------|-------|-------|-------|-------|-------|
| Snake River drainage: | | | | | | | |
| Farewell Bend to railroad bridge----- | 1,196 | 1,184 | 1,146 | 1,322 | 1,223 | 1,420 | 1,351 |
| Payette River (mouth to Emmett)----- | 341 | 345 | 284 | 430 | 308 | 409 | 477 |
| Strike Dam to American Falls Dam----- | 130 | 245 | 148 | 126 | 199 | 224 | 222 |
| North Fork, including Island Park----- | 280 | 348 | 371 | 404 | 473 | 329 | 451 |
| South Fork----- | 116 | 143 | 176 | 204 | 222 | 143 | 239 |
| Mud Lake - Camas Refuge area----- | 213 | 285 | 298 | 257 | 313 | 297 | 210 |
| Gray's Lake area----- | 446 | 426 | 401 | 561 | 596 | 516 | 814 |
| Blackfoot Reservoir area----- | 411 | 507 | 444 | 512 | 580 | 395 | 587 |
| Subtotal----- | 3,133 | 3,483 | 3,268 | 3,816 | 3,914 | 3,733 | 4,351 |
| Bear River and drainage: | | | | | | | |
| Dingle Marsh area----- | 714 | 1,054 | 1,150 | 903 | 1,418 | 1,077 | 2,225 |
| Total----- | 3,847 | 4,537 | 4,418 | 4,719 | 5,332 | 4,810 | 6,576 |

TABLE E-14. --Long-term trend in waterfowl breeding population indexes by species
southern Saskatchewan, May 1956-63

[Index numbers in thousands]

| Species | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|---------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Ducks: | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 2,381.1 | 2,188.9 | 2,999.8 | 1,642.5 | 1,589.5 | 994.6 | 674.1 | 774.4 |
| Black duck----- | | 1.0 | | | | | | |
| Gadwall----- | 109.6 | 121.2 | 51.6 | 63.1 | 67.4 | 35.6 | 64.8 | 103.0 |
| American widgeon--- | 291.9 | 196.6 | 283.3 | 169.7 | 137.3 | 82.2 | 49.9 | 73.0 |
| Green-winged teal-- | 61.6 | 33.0 | 23.7 | 16.7 | 28.9 | 13.9 | 5.3 | 9.1 |
| Blue-winged teal--- | 375.7 | 297.4 | 202.5 | 153.5 | 132.7 | 92.2 | 38.5 | 59.0 |
| Shoveler----- | 381.0 | 294.5 | 202.8 | 146.6 | 294.1 | 108.7 | 27.6 | 101.4 |
| Pintail----- | 1,904.6 | 1,137.6 | 747.9 | 352.1 | 575.1 | 220.6 | 215.8 | 257.7 |
| Wood duck----- | | | | | | | | |
| Subtotal----- | 5,505.5 | 4,270.2 | 4,511.6 | 2,544.6 | 2,825.0 | 1,547.8 | 1,076.0 | 1,377.6 |
| Divers: | | | | | | | | |
| Redhead----- | 149.4 | 108.7 | 61.9 | 40.8 | 50.5 | 23.5 | 57.6 | 14.0 |
| Canvasback----- | 216.5 | 204.4 | 160.9 | 61.2 | 61.0 | 82.9 | 94.6 | 52.4 |
| Scaup----- | 517.7 | 410.2 | 197.9 | 141.7 | 149.7 | 130.8 | 157.0 | 58.3 |
| Ringnecked duck---- | 6.9 | 6.8 | 5.8 | 26.7 | 7.5 | 3.3 | 0.0 | 5.7 |
| Goldeneye----- | 13.3 | 7.0 | 6.5 | 5.6 | 7.9 | 4.7 | 2.4 | 1.6 |
| Bufflehead----- | 7.1 | 15.1 | 13.8 | 11.8 | 12.0 | 11.2 | 1.5 | 10.0 |
| Ruddy----- | 50.8 | 31.1 | 21.8 | 114.8 | 28.9 | 27.3 | 13.4 | 9.9 |
| Subtotal----- | 961.7 | 783.3 | 468.4 | 402.6 | 317.5 | 283.7 | 326.5 | 151.9 |
| Miscellaneous: | | | | | | | | |
| Merganser----- | -- | -- | -- | 0.5 | 11.4 | 4.0 | | 5.4 |
| Scoter----- | 15.8 | 1.0 | 3.7 | 9.2 | 8.1 | 5.7 | | 4.3 |
| Subtotal----- | 15.8 | 1.0 | 3.7 | 9.7 | 19.5 | 9.7 | | 9.7 |
| Total ducks----- | 6,483.0 | 5,054.5 | 4,983.7 | 2,956.9 | 3,162.0 | 1,841.2 | 1,402.5 | 1,539.2 |
| Geese: | | | | | | | | |
| Canada goose----- | | | | 1.8 | 2.6 | 2.5 | 2.5 | 3.6 |
| Coots----- | 455.0 | 394.9 | 147.0 | 175.0 | 109.3 | 73.4 | 56.4 | 26.2 |
| Grand total----- | 6,938.0 | 5,449.4 | 5,130.7 | 3,133.7 | 3,273.9 | 1,917.1 | 1,461.4 | 1,569.0 |

TABLE E-15.--Comparative status of waterfowl breeding population indexes by species and stratum, southern Saskatchewan, May 1962-1963

[Index numbers in thousands]

| Species | Stratum | | | | | Total | | Average 1956 to 1962 | Percent change from | |
|-------------------------|---------|--------|--------|--------|-------|---------|---------|----------------------------|------------------------|---------|
| | A-East | A-West | B-East | B-West | C | 1962 | 1963 | | 1962 | Average |
| Ducks | | | | | | | | | | |
| Dabblers: | | | | | | | | | | |
| Mallard----- | 117.2 | 214.3 | 269.0 | 129.1 | 44.8 | 674.1 | 774.4 | 1,781.6 | +14.9 | -56.5 |
| Black duck----- | -- | -- | -- | -- | -- | -- | -- | 0.1 | -- | -- |
| Gadwall----- | 9.2 | 42.8 | 23.8 | 19.4 | 7.8 | 64.8 | 103.0 | 73.3 | +59.0 | +40.5 |
| American widgeon--- | 5.8 | 19.7 | 27.9 | 15.4 | 4.2 | 49.9 | 73.0 | 173.0 | +46.3 | -57.8 |
| Green-winged teal-- | 0.4 | 2.8 | 3.5 | 2.1 | 0.3 | 5.3 | 9.1 | 26.2 | +71.7 | -65.3 |
| Blue-winged teal--- | 13.9 | 19.3 | 13.6 | 10.5 | 1.7 | 38.5 | 59.0 | 184.6 | +53.2 | -68.0 |
| Shoveler----- | 4.0 | 52.2 | 22.8 | 15.6 | 6.8 | 27.6 | 101.4 | 207.9 | +267.4 | -51.2 |
| Pintail----- | 16.1 | 109.4 | 49.9 | 56.8 | 25.5 | 215.8 | 257.7 | 736.2 | +19.4 | -65.0 |
| Wood duck----- | | | | | | | | | | |
| Subtotal----- | 166.6 | 460.5 | 410.5 | 248.9 | 91.1 | 1,076.0 | 1,377.6 | 3,183.0 | +28.0 | -56.7 |
| Divers: | | | | | | | | | | |
| Redhead----- | 2.1 | 5.0 | 4.3 | 2.6 | -- | 57.6 | 14.0 | 70.3 | -75.7 | -80.1 |
| Canvasback----- | 4.3 | 11.1 | 16.2 | 20.3 | 0.5 | 94.6 | 52.4 | 125.9 | -44.6 | -58.4 |
| Scaup----- | 4.1 | 16.1 | 17.3 | 15.8 | 5.0 | 157.0 | 58.3 | 243.6 | +62.9 | -76.1 |
| Ring-necked duck--- | -- | 1.8 | 3.3 | 0.3 | 0.3 | -- | 5.7 | 8.1 | ++ | -29.6 |
| Goldeneye----- | -- | -- | 1.0 | 0.6 | -- | 2.4 | 1.6 | 67.4 | -33.3 | -76.1 |
| Bufflehead----- | -- | -- | 5.5 | 4.5 | -- | 1.5 | 10.0 | 10.4 | +566.7 | -3.9 |
| Ruddy----- | -- | 3.9 | 4.3 | 1.7 | -- | 13.4 | 9.9 | 41.2 | -26.1 | -76.0 |
| Subtotal----- | 10.5 | 37.9 | 51.9 | 45.8 | 5.8 | 326.5 | 151.9 | 506.2 | -53.5 | -70.0 |
| Miscellaneous: | | | | | | | | | | |
| Merganser----- | -- | 0.4 | 2.9 | 2.1 | -- | -- | 5.4 | 2.3 | ++ | +134.8 |
| Scoter----- | -- | 0.1 | -- | 4.2 | -- | -- | 4.3 | 6.2 | ++ | -30.7 |
| Subtotal----- | -- | 0.5 | 2.9 | 6.3 | -- | -- | 9.7 | 8.5 | ++ | +14.1 |
| Total ducks----- | 177.1 | 498.9 | 465.3 | 301.0 | 96.9 | 1,402.5 | 1,539.2 | 3,697.7 | +9.8 | -58.4 |
| Geese: | | | | | | | | | | |
| Canada goose----- | -- | 0.4 | 2.5 | -- | 0.7 | 2.6 | 3.6 | 1.3 | +38.5 | +176.9 |
| Coots----- | 0.8 | 8.8 | 7.8 | 5.4 | 3.4 | 56.4 | 26.2 | 201.6 | -53.5 | -87.0 |
| Grand total----- | 177.9 | 508.1 | 475.6 | 306.4 | 101.0 | 1,461.5 | 1,569.0 | 3,900.6 | +7.4 | -59.8 |

**TABLE E-16.--Lone Drake long-term trend
expressed as percentage of total drakes,
southern Saskatchewan, 1956-63**

| Year | Percent of Lone Drakes ¹ |
|-----------|-------------------------------------|
| 1956----- | 78.5 |
| 1957----- | 80.7 |
| 1958----- | 80.2 |
| 1959----- | 73.0 |
| 1960----- | 84.7 |
| 1961----- | 71.9 |
| 1962----- | 47.3 |
| 1963----- | 82.6 |

¹ Includes only mallard, pintail, and canvasback

TABLE E-17.--Duck breeding populations, Montana, 1962 and 1963

| | Sheridan County | Hi-Line | | Great Falls- Piedmont | Total |
|-----------------------------|--------------------|---------|---------|--------------------------|---------|
| | | Eastern | Central | | |
| Total area (sq. mi.)----- | 1,440 | 7,926 | 9,468 | 7,020 | 25,854 |
| Area sampled (sq. mi.)----- | 38 | 172 | 94 | 143 | 447 |
| Ducks per sq. mi.: | | | | | |
| 14 year average----- | 26.3 | 5.0 | 10.7 | 8.5 | -- |
| 1962----- | 14.1 | 3.7 | 9.1 | 10.0 | -- |
| 1963----- | 36.2 | 6.9 | 10.6 | 3.9 | -- |
| Population index: | | | | | |
| 1962----- | 20,304 | 29,326 | 86,159 | 70,200 | 205,989 |
| 1963----- | 52,128 | 54,689 | 100,361 | 27,378 | 234,556 |
| Percent change, 1963 from: | | | | | |
| 1962----- | +157 | +86 | +16 | -61 | +14 |

TABLE E-18.--Canada goose breeding population by areas, Montana, 1962-63

| | Hi-Line | Helena | East slope |
|-----------|---------|--------|------------|
| Pairs: | | | |
| 1962----- | 548 | 56 | 116 |
| 1963----- | 575 | 101 | 174 |
| Singles: | | | |
| 1962----- | 74 | 26 | 34 |
| 1963----- | 155 | 61 | 61 |
| Groups: | | | |
| 1962----- | 173 | 126 | 45 |
| 1963----- | 134 | 139 | 91 |
| Total: | | | |
| 1962----- | 1,339 | 360 | 311 |
| 1963----- | 1,439 | 402 | 500 |

TABLE E-19.--Waterfowl breeding populations, North Dakota, South Dakota, western Minnesota, 1959-63

[Index numbers, in thousands]

| Species | 1959 | 1960 | 1961 | 1962 | 1963 |
|-------------------------|------------|------------|------------|--------------|--------------|
| Ducks: | | | | | |
| Dabblers: | | | | | |
| Mallard----- | 166 | 206 | 255 | 315 | 480 |
| Gadwall----- | 7 | 32 | 30 | 73 | 163 |
| American widgeon----- | 29 | 10 | 7 | 6 | 4 |
| Green-winged teal----- | -- | -- | 2 | 3 | 1 |
| Blue-winged teal----- | 127 | 154 | 164 | 203 | 324 |
| Shoveler----- | 21 | 86 | 57 | 184 | 140 |
| Pintail----- | 22 | 201 | 135 | 273 | 165 |
| Subtotal----- | 372 | 689 | 650 | 1,057 | 1,277 |
| Divers: | | | | | |
| Redhead----- | 2 | 24 | 9 | 28 | 39 |
| Canvasback----- | 10 | 9 | 8 | 5 | 17 |
| Scaup----- | 25 | 44 | 27 | 31 | 57 |
| Ring-necked duck----- | -- | Trace | 2 | -- | 9 |
| Ruddy duck----- | 4 | 15 | 6 | 9 | 13 |
| Subtotal----- | 41 | 92 | 52 | 73 | 135 |
| Total ducks----- | 413 | 781 | 702 | 1,130 | 1,412 |
| Coots----- | 88 | 80 | 93 | 129 | 94 |

TABLE E-20.--Waterfowl breeding populations, by species and stratum, North Dakota, South Dakota, and western Minnesota, 1962 and 1963

[Index numbers in thousands]

| Species | Stratum | | | Total | | Average 1958 to 1963 | Percent change from 1962 | |
|-------------------------|------------|------------|------------|--------------|--------------|----------------------------|-----------------------------|---------------|
| | East | Central | West | 1962 | 1963 | | Average | |
| Ducks: | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 126 | 247 | 106 | 268 | 479 | 299 | + 79.0 | + 60.0 |
| Gadwall----- | 29 | 113 | 21 | 74 | 163 | 56 | +120.0 | +191.0 |
| American widgeon----- | 1 | 2 | -- | 5 | 3 | 11 | - 40.0 | - 73.0 |
| Green-winged teal----- | -- | 1 | -- | 2 | 1 | 1 | - 50.0 | -- |
| Blue-winged teal----- | 140 | 166 | 18 | 209 | 324 | 191 | + 55.0 | + 70.0 |
| Shoveler----- | 47 | 93 | 0 | 163 | 140 | 88 | - 14.0 | + 59.0 |
| Pintail----- | 34 | 115 | 16 | 242 | 165 | 164 | - 32.0 | -- |
| Subtotal----- | 377 | 737 | 161 | 963 | 1,275 | 810 | + 32.0 | + 57.0 |
| Divers: | | | | | | | | |
| Redhead----- | 7 | 30 | 2 | 28 | 39 | 19 | + 39.0 | +105.0 |
| Canvasback----- | 5 | 13 | -- | 4 | 18 | 12 | +350.0 | + 50.0 |
| Scaup----- | 36 | 19 | 2 | 66 | 57 | 38 | - 14.0 | + 50.0 |
| Ring-necked duck----- | 8 | 1 | -- | -- | 9 | 2 | -- | +350.0 |
| Ruddy duck----- | 6 | 7 | -- | 10 | 13 | 9 | + 30.0 | + 44.0 |
| Subtotal----- | 62 | 70 | 4 | 108 | 136 | 80 | + 26.0 | + 70.0 |
| Total ducks----- | 439 | 807 | 165 | 1,071 | 1,411 | 890 | + 32.0 | + 58.0 |
| Coots----- | 32 | 62 | 1 | 164 | 95 | 92 | - 43.0 | + 2.0 |

Note.--The 1962 totals have been adjusted to the change in sample intensity brought about by dropping North Dakota (west) coverage which showed it to be insignificant as a contributor.

TABLE E-21.--Lone drake index, long-term trend,
North Dakota, South Dakota, and western
Minnesota, 1959-63

| Year | Percent of total |
|-----------|---------------------|
| 1959----- | 41.5 |
| 1960----- | 73.3 |
| 1961----- | 67.1 |
| 1962----- | 73.9 |
| 1963----- | 77.7 |

TABLE E-22.--Waterfowl breeding pairs, Wyoming, 1961-63

| Species | Number of adult pairs | | | Percent change from 1962 | Percent change from 1955- 62 average | Total duck index | | | Percent change from 1962 | Percent change from 1955- 62 average |
|-------------------|-----------------------|--------|---------|-----------------------------------|---|------------------|---------|---------|-----------------------------------|---|
| | 1961 | 1962 | 1963 | | | 1961 | 1962 | 1963 | | |
| Ducks: | | | | | | | | | | |
| Dabblers: | | | | | | | | | | |
| Mallard----- | 31,539 | 21,918 | 71,024 | +117.4 | + 92.4 | 56,965 | 70,875 | 149,517 | +111.0 | + 73.9 |
| Gadwall----- | 1,884 | 6,621 | 5,025 | - 24.1 | + 44.4 | 4,338 | 15,197 | 10,049 | - 33.9 | + 35.7 |
| American widgeon- | 1,941 | 1,520 | 4,669 | +207.2 | + 48.8 | 5,080 | 4,341 | 11,815 | +172.2 | + 82.0 |
| Teal----- | 4,395 | 5,535 | 7,740 | + 39.8 | + 16.1 | 11,701 | 12,155 | 19,012 | + 56.4 | + 30.7 |
| Shoveler----- | 1,199 | 6,079 | 2,580 | - 57.6 | - 13.2 | 3,253 | 12,483 | 6,518 | - 47.8 | - 2.0 |
| Pintail----- | 3,653 | 13,893 | 20,506 | + 47.6 | +135.0 | 9,247 | 30,607 | 42,506 | + 38.9 | +106.1 |
| Divers: | | | | | | | | | | |
| Redhead----- | 114 | 543 | 407 | - 25.0 | + 16.3 | 913 | 2,279 | 407 | - 82.1 | - 60.6 |
| Canvasback----- | -- | 326 | 407 | + 24.8 | +131.3 | -- | 651 | 407 | - 37.5 | + 35.7 |
| Scaup----- | 342 | 217 | -- | -- | -- | 685 | 434 | -- | -- | -- |
| Goldeneye----- | -- | -- | 407 | -- | -184.6 | -- | -- | 407 | -- | + 85.8 |
| Ruddy duck----- | 171 | 217 | -- | -- | -- | 913 | 2,171 | -- | -- | -- |
| Miscellaneous: | | | | | | | | | | |
| Merganser----- | 1,027 | 651 | 3,531 | +442.4 | +123.1 | 2,396 | 7,706 | 8,556 | + 11.0 | +127.3 |
| Unidentified----- | 1,313 | 4,450 | 6,383 | + 43.4 | +129.2 | 4,053 | 34,189 | 46,851 | + 37.0 | +124.8 |
| Coots----- | 228 | 1,520 | 815 | + 46.4 | - 59.9 | 1,142 | 5,969 | 1,630 | - 72.7 | - 61.6 |
| Total----- | 38,185 | 74,242 | 123,493 | + 66.3 | + 79.1 | 100,686 | 199,057 | 297,675 | + 49.5 | + 71.8 |

TABLE E-23.--Canada goose breeding pairs, by area, Wyoming, 1959-63

| Area | 1959 | 1960 | 1961 | 1962 | 1963 | Percent change from 1962 | Percent change from 9-year average |
|-------------------------|------------------|------|------|------|------|--------------------------|------------------------------------|
| Snake River----- | 385 ¹ | 326 | 208 | 270 | 441 | 63 | |
| Bear River----- | 387 | 408 | 336 | 498 | 757 | 52 | |
| Green River----- | 235 | 297 | 364 | 310 | 478 | 54 | |
| North Platte River----- | 232 | 193 | 240 | 241 | 312 | 29 | |
| Wind River----- | 132 | 176 | 224 | 173 | 182 | 5 | |
| Big Horn River----- | -- | -- | -- | -- | 25 | -- | |
| Total----- | 1336 | 1400 | 1372 | 1492 | 2195 | +47 | +76 |

¹ Figures are average of years 1952-58.

TABLE E-24.--Duck breeding-ground population estimates, Colorado, 1963

| Area | Breeding pairs | | |
|-----------------------------|----------------|--------|---------------------------|
| | 1963 | 1962 | 9-year average, 1954-1962 |
| San Luis Valley----- | 17,377 | 21,717 | 9,982 |
| North Park----- | 5,278 | 3,167 | 3,777 |
| South Platte Valley----- | 10,513 | 4,596 | 2,752 |
| Cache la Poudre Valley----- | 2,276 | 1,848 | 1,660 |
| Yampa Valley----- | 3,494 | 4,924 | 2,972 |
| Brown's Park----- | 60 | 82 | 116 |
| Totals----- | 38,998 | 36,334 | 21,259 |

TABLE E-25.--Species composition of breeding duck population, Colorado, 1963

| Species | Number | | | Percent | | |
|------------------------|--------|--------|-------------------|---------|-------|-------------------|
| | 1963 | 1962 | 1954-1962 average | 1963 | 1962 | 1954-1962 average |
| Dabblers: | | | | | | |
| Mallard----- | 31,026 | 26,691 | 13,425 | 79.9 | 73.5 | 63.2 |
| Mexican duck----- | -- | -- | -- | -- | -- | -- |
| Gadwall----- | 1,358 | 3,454 | 2,010 | 3.4 | 9.5 | 9.4 |
| American widgeon----- | 76 | 66 | 268 | 0.2 | 0.2 | 1.3 |
| Green-winged teal----- | 242 | 232 | 480 | 0.6 | 0.6 | 2.3 |
| Blue-winged teal----- | 3,718 | 1,501 | 1,048 | 9.4 | 4.1 | 4.9 |
| Cinnamon teal----- | 369 | 571 | 623 | 0.9 | 1.6 | 2.9 |
| Shoveler----- | 471 | 340 | 672 | 1.2 | 0.9 | 3.2 |
| Pintail----- | 838 | 1,451 | 1,447 | 2.1 | 4.0 | 6.8 |
| Wood duck----- | -- | -- | -- | -- | -- | -- |
| Divers: | | | | | | |
| Redhead----- | 554 | 1,372 | 704 | 1.4 | 3.8 | 3.3 |
| Canvasback----- | -- | -- | -- | -- | -- | 0.1 |
| Scaup----- | 2 | 536 | 372 | Trace | 1.4 | 1.8 |
| Ring-necked duck----- | -- | 1 | -- | -- | Trace | -- |
| Bufflehead----- | -- | -- | 2 | -- | -- | Trace |
| Ruddy duck----- | -- | -- | 2 | -- | -- | Trace |
| Miscellaneous: | | | | | | |
| Merganser----- | 317 | 59 | 113 | 0.8 | 0.2 | 0.5 |
| Total----- | 38,998 | 36,334 | 21,253 | 100.0 | 100.0 | 100.0 |

TABLE E-26.--Waterfowl breeding populations, by stratum, northern Saskatchewan, northern Manitoba, and western Ontario, May 1962 and 1963

[Index numbers, in thousands]

| Species | Stratum | | | | | Total | | Percent change |
|------------------------|--------------|----------|-----|----------------|-------|-------|------|----------------|
| | Ontario C | Manitoba | | Saskatchewan C | | 1962 | 1963 | |
| | | D | C | South | North | | | |
| Ducks: | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 50 | 28 | 32 | 60 | 9 | 269 | 179 | -33 |
| Black duck----- | 24 | -- | -- | -- | 1 | 55 | 25 | -55 |
| Gadwall----- | -- | 5 | -- | 2 | 1 | 5 | 8 | +60 |
| American widgeon----- | 3 | 6 | 8 | 6 | 1 | 38 | 24 | -36 |
| Green-winged teal----- | -- | 1 | 4 | 2 | 3 | 13 | 10 | -24 |
| Blue-winged teal----- | 1 | 13 | -- | 14 | 1 | 27 | 30 | +11 |
| Pintail----- | 2 | 7 | 2 | 8 | 1 | 13 | 20 | +53 |
| Subtotal----- | 79 | 70 | 46 | 94 | 16 | 431 | 305 | -29 |
| Divers: | | | | | | | | |
| Redhead----- | -- | 5 | -- | 5 | -- | 11 | 10 | -10 |
| Canvasback----- | -- | 17 | -- | 9 | 5 | 12 | 31 | +176 |
| Scaup----- | 36 | 36 | 24 | 54 | 106 | 235 | 256 | +9 |
| Ring-necked duck----- | 27 | 8 | 16 | 34 | 35 | 92 | 120 | +30 |
| Goldeneye----- | 27 | 3 | 5 | 4 | 8 | 115 | 47 | -59 |
| Bufflehead----- | 9 | 3 | 2 | 6 | 7 | 40 | 27 | -32 |
| Ruddy duck----- | -- | 1 | -- | 2 | -- | 11 | 4 | -74 |
| Subtotal----- | 99 | 73 | 47 | 114 | 161 | 516 | 494 | -5 |
| Miscellaneous: | | | | | | | | |
| Scoter----- | 4 | -- | 10 | 2 | 7 | 23 | 23 | -NC |
| Merganser----- | 78 | 7 | 43 | 20 | 18 | 192 | 166 | -14 |
| Subtotal----- | 82 | 7 | 53 | 22 | 25 | 215 | 189 | -12 |
| Total ducks----- | 260 | 150 | 146 | 230 | 202 | 1,162 | 988 | -15 |
| Canada geese----- | 28 | 2 | 1 | -- | -- | 10 | 31 | +310 |
| Coots----- | -- | 15 | -- | 3 | -- | 6 | 18 | +300 |

TABLE E-27.--Waterfowl breeding populations, by species, northern Saskatchewan, northern Manitoba, and western Ontario, May 1956-1963

[Index numbers, in thousands]

| Species | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|---------------------|------|------|------|-------|-------|------|-------|------|
| Ducks: | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 246 | 260 | 264 | 245 | 260 | 220 | 267 | 178 |
| Black duck----- | 1 | -- | 6 | 16 | 10 | 31 | 56 | 25 |
| Gadwall----- | -- | 4 | -- | 10 | 1 | 15 | 4 | 8 |
| American widgeon--- | 8 | 7 | 8 | 17 | 24 | 22 | 37 | 24 |
| Green-winged teal-- | 6 | 6 | -- | 16 | 6 | 6 | 14 | 10 |
| Blue-winged teal--- | 3 | 1 | 18 | 12 | 9 | 3 | 27 | 30 |
| Shoveler----- | -- | 1 | -- | 5 | 6 | 6 | 11 | 12 |
| Pintail----- | 17 | 12 | 6 | 17 | 34 | 58 | 13 | 20 |
| Subtotal----- | 281 | 291 | 302 | 338 | 350 | 361 | 429 | 307 |
| Divers: | | | | | | | | |
| Redhead----- | 4 | 6 | -- | -- | 32 | 22 | 11 | 10 |
| Canvasback----- | 6 | 2 | 22 | 27 | 107 | 50 | 11 | 32 |
| Scaup----- | 187 | 446 | 269 | 329 | 209 | 212 | 235 | 256 |
| Ring-necked duck--- | 8 | 1 | -- | -- | 12 | 15 | 92 | 121 |
| Goldeneye----- | 5 | 9 | 69 | 187 | 84 | 73 | 115 | 47 |
| Bufflehead----- | 12 | 5 | 20 | 23 | 82 | 21 | 40 | 27 |
| Ruddy duck----- | -- | -- | -- | -- | Trace | 7 | 11 | 4 |
| Subtotal----- | 222 | 469 | 380 | 566 | 526 | 400 | 515 | 497 |
| Miscellaneous: | | | | | | | | |
| Scoter----- | 7 | 53 | 36 | 64 | 15 | 34 | 23 | 22 |
| Merganser----- | 62 | 133 | 218 | 106 | 252 | 127 | 191 | 166 |
| Subtotal----- | 69 | 186 | 254 | 170 | 267 | 161 | 214 | 188 |
| Total ducks----- | 572 | 946 | 936 | 1,074 | 1,143 | 922 | 1,158 | 992 |
| Canada geese----- | 14 | 5 | -- | 35 | 8 | 12 | 11 | 31 |
| Coots----- | -- | -- | -- | 13 | 11 | 30 | 6 | 18 |

TABLE E-28.--Long-term trend in waterfowl breeding population indexes by species
southern Manitoba (Stratum A and B), 1955-1963

| Species | 1955 | 1956 | 1957 | 1958 ¹ | 1959 ¹ | 1960 | 1961 | 1962 | 1963 |
|------------------------|---------|---------|---------|-------------------|-------------------|---------|---------|---------|---------|
| Ducks: | | | | | | | | | |
| Dabblers: | | | | | | | | | |
| Mallard----- | 355,700 | 491,000 | 500,000 | 490,500 | 303,600 | 322,100 | 211,100 | 129,200 | 182,038 |
| Black duck----- | -- | 1,000 | -- | -- | -- | -- | -- | -- | 1,390 |
| Gadwall----- | 8,200 | 5,000 | 5,500 | 7,700 | 4,900 | 4,200 | 9,900 | 9,200 | 14,291 |
| Baldpate----- | 27,700 | 26,700 | 24,700 | 53,000 | 29,600 | 12,700 | 19,600 | 10,800 | 15,153 |
| Green-winged teal----- | 3,900 | 1,700 | 3,400 | 7,200 | 4,500 | 2,200 | 5,300 | 400 | 4,671 |
| Blue-winged teal----- | 87,800 | 53,200 | 62,700 | 124,900 | 140,800 | 94,900 | 84,100 | 43,900 | 46,989 |
| Shoveler----- | 25,100 | 27,800 | 38,300 | 28,200 | 36,000 | 53,600 | 38,600 | 17,400 | 33,334 |
| Pintail----- | 129,500 | 150,000 | 99,300 | 73,100 | 40,800 | 97,500 | 43,300 | 41,300 | 61,680 |
| Wood duck----- | -- | -- | -- | 200 | -- | -- | -- | -- | -- |
| Subtotal----- | 637,900 | 756,400 | 733,900 | 784,800 | 560,200 | 587,200 | 411,900 | 252,200 | 359,546 |
| Divers: | | | | | | | | | |
| Redhead----- | 25,200 | 20,900 | 16,900 | 26,600 | 23,300 | 25,800 | 9,900 | 13,500 | 33,827 |
| Canvasback----- | 28,400 | 39,200 | 31,400 | 56,600 | 17,900 | 37,400 | 31,300 | 23,000 | 30,530 |
| Scaup----- | 54,000 | 78,800 | 60,200 | 70,500 | 48,000 | 145,900 | 114,800 | 76,100 | 55,742 |
| Ring-necked duck----- | 1,500 | 7,000 | 3,800 | 5,600 | 9,900 | 4,600 | 5,500 | 2,400 | 6,753 |
| Goldeneye----- | 4,000 | 4,500 | 5,400 | 2,300 | 9,300 | 4,600 | 3,900 | 2,900 | 1,070 |
| Bufflehead----- | 5,700 | 1,900 | 400 | 3,400 | 3,900 | 4,100 | 3,300 | 1,500 | 5,372 |
| Ruddy duck----- | 12,300 | 6,700 | 7,000 | 6,200 | 8,700 | 15,800 | 18,300 | 8,200 | 14,569 |
| Subtotal----- | 131,100 | 159,000 | 125,100 | 171,200 | 121,000 | 238,200 | 187,000 | 127,600 | 147,863 |
| Miscellaneous: | | | | | | | | | |
| Merganser----- | 100 | -- | -- | -- | -- | -- | 100 | -- | -- |
| Scoters----- | 200 | 1,400 | 1,300 | 700 | -- | -- | 1,500 | -- | 360 |
| Other----- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Subtotal----- | 300 | 1,400 | 1,300 | 700 | -- | -- | 1,600 | -- | 360 |
| Total ducks----- | 769,300 | 916,800 | 860,300 | 956,700 | 681,200 | 825,400 | 600,500 | 379,800 | 507,769 |
| Coots----- | 28,500 | 40,000 | 20,800 | 80,900 | 166,000 | 96,000 | 80,400 | 34,000 | 54,426 |
| Grand Total----- | 797,800 | 956,800 | 881,100 | 1,037,600 | 847,200 | 921,400 | 680,900 | 413,800 | 562,195 |

¹ Figures for 1958 and 1959 do not include flocked ducks.

**TABLE E-29.--Comparative status of waterfowl breeding population indexes
by species and stratum, southern Manitoba, 1962 and 1963**

| Species | Stratum | | Total | | Average 1953 to 1962 | Percent change from | |
|-----------------------|---------|---------|------------------|-----------------|----------------------------|---------------------|---------|
| | A | B | Previous year | Current year | | 1962 | Average |
| Ducks: | | | | | | | |
| Dabblers: | | | | | | | |
| Mallard----- | 84,546 | 97,492 | 129,200 | 182,038 | 307,660 | +40.9 | -40.8 |
| Black duck----- | 131 | 1,259 | -- | 1,390 | -- | -- | -- |
| Gadwall----- | 9,435 | 4,856 | 9,200 | 14,291 | 7,100 | +55.3 | +101.3 |
| American widgeon--- | 8,857 | 6,296 | 10,800 | 15,153 | 23,480 | +40.3 | -35.5 |
| Green-winged teal-- | 894 | 3,777 | 400 | 4,671 | 3,650 | +1,167.8 | +28.0 |
| Blue-winged teal--- | 28,462 | 18,527 | 43,900 | 46,989 | 79,780 | +7.0 | -41.1 |
| Shoveler----- | 16,426 | 16,908 | 17,400 | 33,334 | 28,740 | +91.6 | +16.0 |
| Pintail----- | 29,303 | 32,377 | 41,300 | 61,680 | 78,320 | +49.3 | -21.2 |
| Wood duck----- | -- | -- | -- | -- | -- | -- | -- |
| Subtotal----- | 178,054 | 181,492 | 252,200 | 359,546 | 528,730 | +42.6 | -32.0 |
| Divers: | | | | | | | |
| Redhead----- | 13,141 | 20,686 | 13,500 | 33,827 | 19,170 | +150.6 | +76.5 |
| Canvasback----- | 22,076 | 8,454 | 23,000 | 30,530 | 30,710 | +32.7 | -0.6 |
| Scaup----- | 19,947 | 35,795 | 76,100 | 55,742 | 76,650 | -26.8 | -27.3 |
| Ring-necked duck---- | 2,076 | 4,677 | 2,400 | 6,753 | 4,440 | +181.4 | +52.1 |
| Goldeneye----- | 710 | 360 | 2,900 | 1,070 | 4,330 | -63.1 | -75.3 |
| Bufflehead----- | 1,235 | 4,137 | 1,500 | 5,372 | 3,210 | +258.1 | +67.4 |
| Ruddy----- | 8,094 | 6,475 | 8,200 | 14,569 | 8,770 | +77.7 | +66.1 |
| Subtotal----- | 67,279 | 80,584 | 127,600 | 147,863 | 147,280 | +15.9 | +0.4 |
| Miscellaneous: | | | | | | | |
| Scaup----- | -- | 360 | -- | 360 | 540 | -- | -33.3 |
| Subtotal----- | -- | 360 | -- | 360 | 540 | -- | -33.3 |
| Total ducks----- | 245,333 | 262,436 | 379,800 | 507,769 | 676,550 | +33.7 | -24.9 |
| Geese: | | | | | | | |
| Canada goose----- | -- | -- | -- | -- | -- | -- | -- |
| Coots----- | 27,805 | 26,621 | 34,000 | 54,426 | 56,480 | +60.1 | -3.4 |
| Grand total----- | 273,138 | 289,057 | 413,800 | 562,195 | 733,030 | +35.9 | -23.3 |

**TABLE E-30.--Lone drake index expressed as
percentage of total drakes, southern Manitoba,
1953-63**

| Year | Percent lone drakes ¹ |
|-----------|-------------------------------------|
| 1953----- | 70.1 |
| 1954----- | 79.6 |
| 1955----- | 87.5 |
| 1956----- | 79.4 |
| 1957----- | 89.2 |
| 1958----- | 81.9 |
| 1959----- | 70.0 |
| 1960----- | 86.5 |
| 1961----- | 67.5 |
| 1962----- | 62.0 |
| 1963----- | 80.1 |

¹ Includes only mallards, pintails, and canvasback.

TABLE E-31.--Percent lone drakes to lone males during breeding population surveys, southwest Manitoba, 1960-63

| Year | Mallard | Pintail | Mallard and Pintail | Canvasback |
|-----------|---------|---------|---------------------|------------|
| 1960----- | -- | -- | 70 | 78 |
| 1961----- | 45 | 34 | 42 | -- |
| 1962----- | 57 | 72 | 61 | 41 |
| 1963----- | 75 | 67 | 73 | 73 |

TABLE E-32.--Waterfowl breeding populations, by species, southern Manitoba, 1960-63

| Species | 1960 | 1961 | 1962 | 1963 | Percent change from: | |
|------------------------|-------|-------|-------|-------|----------------------|------|
| | | | | | 1960 | 1962 |
| Ducks: | | | | | | |
| Dabblers: | | | | | | |
| Mallard----- | 968 | 890 | 746 | 664 | -31 | -11 |
| Gadwall----- | 128 | 188 | 114 | 86 | -33 | -25 |
| American widgeon----- | 152 | 158 | 150 | 128 | -16 | -15 |
| Green-winged teal----- | 52 | 53 | 34 | 48 | -8 | +41 |
| Blue-winged teal----- | 710 | 783 | 496 | 748 | +5 | +51 |
| Shoveler----- | 290 | 264 | 210 | 222 | -23 | +6 |
| Pintail----- | 575 | 366 | 284 | 294 | -49 | +4 |
| Subtotal----- | 2,875 | 2,702 | 2,034 | 2,190 | -24 | +8 |
| Divers: | | | | | | |
| Redhead----- | 201 | 123 | 156 | 124 | -38 | -21 |
| Canvasback----- | 142 | 94 | 152 | 103 | -28 | -32 |
| Scaup----- | 168 | 116 | 134 | 128 | -24 | -4 |
| Ring-necked duck----- | 66 | 23 | 34 | 12 | -82 | -65 |
| Goldeneye----- | 21 | 4 | 8 | 6 | -71 | -25 |
| Bufflehead----- | 12 | 14 | 9 | 8 | -33 | -11 |
| Ruddy duck----- | 96 | 71 | 40 | 70 | -27 | +75 |
| Subtotal----- | 706 | 445 | 533 | 451 | -37 | -15 |
| Miscellaneous: | | | | | | |
| Scoter----- | 4 | -- | -- | -- | -- | -- |
| Unidentified----- | 7 | 22 | 22 | -- | -- | -- |
| Total----- | 3,592 | 3,169 | 2,589 | 2,641 | -27 | +2 |

TABLE E-33.--Species breeding composition percentage, southern Manitoba, 1960-63

| Species | 1960 | 1961 | 1962 | 1963 |
|------------------------|-------|------|------|------|
| Ducks: | | | | |
| Dabblers: | | | | |
| Mallard----- | 27.1 | 28.1 | 29.0 | 25.1 |
| Gadwall----- | 3.5 | 6.0 | 4.4 | 3.3 |
| American widgeon----- | 4.2 | 5.1 | 5.8 | 4.8 |
| Green-winged teal----- | 1.4 | 1.7 | 1.3 | 1.8 |
| Blue-winged teal----- | 19.8 | 24.8 | 19.3 | 28.3 |
| Shoveler----- | 8.0 | 8.4 | 8.2 | 8.4 |
| Pintail----- | 16.2 | 11.6 | 11.1 | 11.1 |
| Subtotal----- | 80.4 | 85.7 | 79.1 | 82.8 |
| Divers: | | | | |
| Redhead----- | 6.3 | 3.9 | 6.1 | 4.7 |
| Canvasback----- | 3.8 | 3.0 | 5.9 | 3.9 |
| Scaup----- | 4.6 | 3.7 | 5.2 | 4.8 |
| Ring-necked duck----- | 1.8 | 0.7 | 1.3 | 0.5 |
| Goldeneye----- | 0.6 | 0.1 | 0.3 | 0.2 |
| Bufflehead----- | 0.3 | 0.4 | 0.4 | 0.3 |
| Ruddy duck----- | 2.6 | 2.3 | 1.6 | 2.7 |
| Subtotal----- | 19.8 | 14.1 | 20.8 | 17.1 |
| Total----- | 100.2 | 99.8 | 99.9 | 99.9 |

TABLE E-34.--Duck breeding population counts in ten counties, Minnesota, 1958-63 ¹

| Species | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|-----------------------|------|------|------|------|------|------|
| Mallard----- | 170 | 129 | 130 | 109 | 126 | 120 |
| Blue-winged teal----- | 266 | 401 | 322 | 314 | 339 | 327 |
| Redhead----- | 14 | 45 | 30 | 58 | 39 | 48 |
| Canvasback----- | -- | 1 | 5 | 6 | 11 | 18 |
| Wood duck----- | 5 | 15 | 12 | 11 | 21 | 31 |
| Other----- | 135 | 133 | 122 | 140 | 196 | 158 |
| Total----- | 590 | 724 | 621 | 638 | 732 | 702 |

¹ Not corrected for observability.

TABLE E-35.--Statewide aerial estimates of duck breeding population, Minnesota, 1951-63

| Year | Total ducks observed ¹ | |
|-----------|-----------------------------------|--------------------------|
| | Statewide ² | Minnesota (west central) |
| 1951----- | 2,247 | 701 |
| 1952----- | 2,652 | 1,037 |
| 1955----- | 1,455 | 541 |
| 1956----- | 2,735 | 1,071 |
| 1957----- | -- | 735 |
| 1958----- | -- | 914 |
| 1963----- | 1,641 | 995 |

¹ Less Scaup.

² Adjusted for comparable coverage.

TABLE E-36.--Duck breeding populations by area and species, Minnesota, 1958-63

| Area/Species | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|-----------------------|------|------|------|------|------|------|
| Six Study Lakes | | | | | | |
| Beltrami County: | | | | | | |
| Mallard----- | 178 | 157 | 126 | 121 | 85 | 117 |
| Blue-winged teal----- | 42 | 45 | 42 | 40 | 34 | 45 |
| Wood duck----- | 14 | 14 | 18 | 18 | 20 | 31 |
| Other----- | 123 | 136 | 138 | 125 | 138 | 136 |
| Subtotal----- | 357 | 352 | 324 | 304 | 277 | 329 |
| Study Area | | | | | | |
| Mahnomen County: | | | | | | |
| Mallard----- | 40 | 40 | 20 | 25 | 20 | 48 |
| Blue-winged teal----- | 40 | 55 | 60 | 50 | 55 | 50 |
| Redhead----- | 10 | 20 | 5 | 10 | 20 | 43 |
| Canvasback----- | 10 | 10 | 5 | 10 | 10 | 4 |
| Ring-necked duck----- | 20 | 20 | 5 | 10 | 20 | 8 |
| Subtotal----- | 120 | 145 | 95 | 105 | 125 | 153 |
| Study Area | | | | | | |
| Ottertall County: | | | | | | |
| Mallard----- | 12 | 6 | 9 | 10 | 14 | 29 |
| Blue-winged teal----- | 30 | 55 | 53 | 62 | 95 | 72 |
| Other----- | 2 | 14 | 11 | 14 | 10 | 19 |
| Subtotal----- | 44 | 75 | 73 | 86 | 119 | 120 |
| Study Area | | | | | | |
| Pope County: | | | | | | |
| Mallard----- | 4 | 5 | 5 | 5 | 4 | 5 |
| Blue-winged teal----- | 17 | 33 | 42 | 39 | 25 | 20 |
| Other----- | 5 | 7 | 7 | 3 | 3 | 1 |
| Subtotal----- | 26 | 45 | 54 | 47 | 32 | 26 |
| Thief Lake Refuge: | | | | | | |
| (portion) | | | | | | |
| Mallard----- | -- | -- | 7 | 9 | -- | 13 |
| Blue-winged teal----- | -- | -- | 18 | 25 | -- | 36 |
| Wood duck----- | -- | -- | 0 | 0 | -- | 7 |
| Other----- | -- | -- | 7 | 10 | -- | 20 |
| Subtotal----- | | | 32 | 44 | -- | 76 |
| Total----- | 547 | 617 | 578 | 580 | 553 | 704 |

TABLE E-37.--Waterfowl breeding population, by area and year, Chippewa National Forest, Minnesota, 1958-63

| AREA | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|--------------------|-------|-------|-------|-------|-------|-------|
| Bowstring----- | 717 | 121 | 684 | 325 | 242 | 238 |
| Burns----- | 80 | 99 | 111 | 127 | 24 | 107 |
| Kitchie----- | 226 | 191 | 247 | 249 | 34 | 112 |
| Lower Pigeon----- | 119 | 50 | 19 | 70 | 10 | 117 |
| Mud Lake----- | -- | 10 | 153 | 391 | 153 | 251 |
| Raven Lake----- | 9 | 32 | 1 | 24 | 10 | 17 |
| Round Lake----- | 350 | 375 | 383 | 352 | 207 | 327 |
| Third River----- | 281 | 377 | 497 | 382 | 133 | 141 |
| Lake Winnie----- | 69 | 70 | 204 | 223 | 154 | 568 |
| Bigoshish----- | -- | -- | -- | -- | -- | -- |
| Rabideau Lake----- | 182 | 235 | 344 | 189 | 46 | 247 |
| Totals----- | 2,033 | 1,560 | 2,643 | 2,332 | 1,013 | 2,125 |

TABLE E-38.--Species composition, Chippewa National Forest, Minnesota 1958-1963

| SPECIES | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|-----------------------|------|------|------|------|------|------|
| Mallard----- | 57 | 49 | 52 | 42 | 45 | 52 |
| American widgeon----- | 19 | 24 | 19 | 23 | 14 | 8 |
| Blue-winged teal----- | 8 | 3 | 3 | 10 | 4 | 11 |
| Wood duck----- | 4 | 2 | 5 | 8 | 9 | 13 |
| Ring-necked duck----- | -- | 4 | 3 | 5 | 4 | 1 |
| Goldeneye----- | 11 | 15 | 16 | 10 | 19 | 12 |
| Other----- | 1 | 3 | 2 | 2 | 4 | 3 |

TABLE E-39.--Duck breeding population indexes, Michigan, 1951-63

| Year | Lineal miles censused | Potential breeders per lineal mile | |
|-----------|-----------------------|------------------------------------|-------------|
| | | Wood duck | All species |
| 1951----- | 120.0 | 0.32 | 8.18 |
| 1952----- | 82.0 | .21 | 7.13 |
| 1953----- | 95.5 | .85 | 12.75 |
| 1954----- | 93.5 | .58 | 12.31 |
| 1955----- | 111.2 | .70 | 11.00 |
| 1956----- | 110.5 | .28 | 11.48 |
| 1957----- | 135.4 | .46 | 9.30 |
| 1958----- | 121.0 | .33 | 15.00 |
| 1959----- | 135.0 | .65 | 13.46 |
| 1960----- | 124.4 | .66 | 13.26 |
| 1961----- | 126.4 | .83 | 17.07 |
| 1962----- | 138.8 | 1.77 | 19.11 |
| 1963----- | 128.5 | 2.03 ¹ | 20.10 |

¹ Lineal miles for wood duck was 136.5

TABLE E-40. --Waterfowl breeding population indexes, eastern Ontario, Quebec, and Labrador, 1955-63

| Species | 1955 | 1956 | 1957-61 | 1962 ¹ | 1963 |
|---------------------------------|-----------|-----------|---------|-------------------|---------|
| Ducks: | | | | | |
| Dabblers: | | | | | |
| Mallard----- | 900 | 9,500 | | 14,000 | 50,000 |
| Black duck----- | 247,700 | 288,700 | | 96,400 | 193,400 |
| American widgeon----- | 1,900 | -- | N | 8,700 | 5,600 |
| Green-winged teal----- | 900 | 4,000 | O | 7,300 | 30,700 |
| Pintail----- | 11,400 | 3,300 | | -- | 13,700 |
| Wood duck----- | -- | -- | | -- | 700 |
| Subtotal----- | 262,800 | 305,500 | -- | 126,400 | 294,100 |
| Divers: | | | | | |
| Redhead----- | 900 | -- | | -- | -- |
| Canvasback----- | -- | -- | S | 2,600 | 700 |
| Scaup----- | 76,500 | 201,900 | U | 19,700 | 37,000 |
| Ring-necked duck----- | -- | 2,900 | R | 11,000 | 24,900 |
| Goldeneye----- | 254,400 | 154,500 | V | 15,000 | 46,400 |
| Bufflehead----- | -- | 21,500 | E | 7,000 | 54,600 |
| Old squaw----- | -- | -- | Y | -- | 1,100 |
| Ruddy duck----- | -- | -- | | -- | 1,000 |
| Subtotal----- | 331,800 | 380,800 | -- | 55,300 | 165,700 |
| Miscellaneous: | | | | | |
| Scoter----- | 72,600 | 53,700 | | -- | 21,800 |
| Merganser----- | 288,700 | 265,600 | | 32,400 | 210,300 |
| Subtotal----- | 361,300 | 319,300 | | 32,400 | 232,100 |
| Total ducks----- | 955,900 | 1,005,600 | -- | 214,100 | 691,900 |
| Geese: | | | | | |
| Canada goose ² ----- | 64,900 | 108,400 | -- | 27,900 | 55,700 |
| Totals----- | 1,020,800 | 1,114,000 | -- | 242,000 | 747,600 |

¹ Data not comparable because of timing of survey.

² This survey does not cover the principal goose areas.

TABLE E-41.--Waterfowl population indexes by strata, eastern Ontario, Quebec, and Labrador, May-June 1955-56 and 1962¹-63

| Species | Mixed boreal | | | | Main boreal | | | | Open boreal and forest tundra | | | |
|----------------------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|-------------------------------|----------------|---------------|----------------|
| | 1955 | 1956 | 1962 | 1963 | 1955 | 1956 | 1962 | 1963 | 1955 | 1956 | 1962 | 1963 |
| Ducks: | | | | | | | | | | | | |
| Dabblers: | | | | | | | | | | | | |
| Mallard ----- | -- | 700 | 1,100 | 19,200 | 900 | 3,900 | 9,000 | 23,300 | -- | 4,900 | -- | 4,700 |
| Black duck ----- | 16,100 | 16,500 | 18,000 | 22,500 | 77,800 | 78,900 | 72,000 | 111,900 | 153,500 | 193,300 | 14,000 | 140,300 |
| American widgeon | -- | -- | 4,600 | 3,300 | 1,900 | -- | 19,100 | 700 | -- | -- | -- | -- |
| Green-winged teal | -- | -- | 5,100 | 16,400 | 900 | 700 | -- | 6,600 | -- | 3,300 | -- | 4,700 |
| Pintail ----- | -- | -- | -- | 2,800 | -- | -- | -- | 6,300 | 11,400 | 3,300 | -- | 10,400 |
| Subtotal ----- | 16,100 | 17,200 | 28,800 | 64,200 | 81,500 | 83,500 | 100,100 | 148,800 | 164,900 | 204,800 | 14,000 | 160,100 |
| Divers: | | | | | | | | | | | | |
| Redhead ----- | -- | -- | -- | -- | 900 | -- | -- | -- | -- | -- | -- | -- |
| Canvasback ----- | -- | -- | 2,200 | 500 | -- | -- | -- | -- | -- | -- | -- | -- |
| Scaup ----- | -- | 4,900 | 8,300 | 12,300 | 7,600 | 130,800 | 10,500 | 16,700 | 68,900 | 66,200 | -- | 10,400 |
| Ring-necked duck | -- | -- | -- | 3,300 | -- | 2,900 | 12,800 | 18,400 | -- | -- | 14,000 | 6,600 |
| Goldeneye ----- | -- | -- | -- | 4,300 | 91,100 | 46,800 | 18,700 | 20,900 | 161,500 | 107,700 | -- | 52,100 |
| Bufflehead ----- | -- | -- | 1,100 | 7,200 | -- | 12,400 | 18,300 | 37,900 | -- | 9,100 | 23,300 | 19,000 |
| Ruddy duck ----- | -- | -- | -- | -- | -- | -- | 1,600 | -- | -- | -- | -- | -- |
| Subtotal ----- | -- | 4,900 | 11,600 | 27,600 | 99,600 | 192,900 | 61,900 | 93,900 | 230,400 | 183,000 | 37,300 | 88,100 |
| Miscellaneous: | | | | | | | | | | | | |
| Scoter ----- | -- | -- | -- | -- | 32,400 | 27,400 | -- | 4,200 | 50,200 | 26,300 | -- | 46,400 |
| Merganser ----- | 5,900 | 2,100 | 5,100 | 21,500 | 181,100 | 276,400 | 37,000 | 86,600 | 395,300 | 387,800 | 46,600 | 237,900 |
| Subtotal ----- | 5,900 | 2,100 | 5,100 | 21,500 | 213,500 | 303,800 | 37,000 | 90,800 | 445,500 | 414,100 | 46,600 | 284,300 |
| Total ducks ----- | 22,000 | 24,200 | 45,500 | 113,300 | 394,600 | 580,200 | 199,000 | 333,500 | 840,800 | 801,900 | 97,900 | 532,500 |
| Canada goose ----- | -- | -- | -- | -- | 3,300 | 50,000 | 33,305 | 26,800 | 61,600 | 58,400 | -- | 95,700 |
| Total waterfowl --- | 22,000 | 24,200 | 45,500 | 113,300 | 397,900 | 630,200 | 232,305 | 360,300 | 902,400 | 860,300 | 97,900 | 628,200 |

¹ Data 1962 not comparable because of time of survey.

TABLE E-42.--Total waterfowl population indices, eastern Ontario, Quebec, and Labrador, May-June 1955-56 and 1962-63

| Species | 1955 | 1956 | 1962 ¹ | 1963 |
|------------------------|-----------|-----------|-------------------|-----------|
| Ducks: | | | | |
| Dabblers: | | | | |
| Mallard----- | 900 | 9,500 | 10,100 | 47,200 |
| Black duck----- | 247,400 | 288,700 | 104,000 | 274,700 |
| American widgeon----- | 1,900 | -- | 23,700 | 4,000 |
| Green-winged teal----- | 900 | 4,000 | 5,100 | 27,700 |
| Pintail----- | 11,400 | 3,300 | -- | 19,500 |
| Subtotal----- | 262,500 | 305,500 | 142,900 | 373,100 |
| Divers: | | | | |
| Redhead----- | 900 | -- | -- | -- |
| Canvasback----- | -- | -- | 2,200 | 500 |
| Scaup----- | 76,500 | 201,900 | 18,800 | 39,400 |
| Ring-necked duck----- | -- | 2,900 | 26,800 | 28,300 |
| Goldeneye----- | 254,400 | 154,500 | 18,700 | 77,300 |
| Bufflehead----- | -- | 21,500 | 42,700 | 64,100 |
| Ruddy duck----- | -- | -- | 1,600 | -- |
| Subtotal----- | 331,800 | 380,800 | 110,800 | 209,600 |
| Miscellaneous: | | | | |
| Scoter----- | 82,600 | 53,700 | -- | 50,600 |
| Merganser----- | 288,700 | 265,600 | 88,700 | 346,000 |
| Subtotal----- | 371,300 | 319,300 | 88,700 | 396,600 |
| Total ducks----- | 965,600 | 1,005,600 | 342,400 | 979,300 |
| Canada goose----- | 64,900 | 108,400 | 33,405 | 122,500 |
| Total waterfowl----- | 1,030,500 | 1,114,000 | 375,805 | 1,101,800 |

¹ Data 1962 not comparable because of time of survey.

TABLE E-43.--Percent lone drakes, eastern Ontario, Quebec, and Labrador, 1955-63

| | 1955 | 1956 | 1962 | 1963 |
|------------------------------------|------|------|------|------|
| Mixed boreal----- | 22.2 | 47.1 | 45.1 | 23.0 |
| Main boreal----- | 39.1 | 14.5 | 40.4 | 41.2 |
| Open boreal and forest tundra----- | 27.6 | 15.5 | 50.0 | 47.0 |
| Average (all strata)----- | 31.5 | 16.4 | 42.0 | 38.8 |

F. PRODUCTION SURVEY TABLES

TABLE F-1.--Number and size of duck broods, Minto Lakes study area, Alaska, 1962 and 1963

| Species | Minto Lakes | | | |
|-------------------------|------------------|--------------|------------------|--------------|
| | 1962 | | 1963 | |
| | Number of broods | Average size | Number of broods | Average size |
| Dabblers: | | | | |
| Mallard----- | 16 | 5.8 | 18 | 6.6 |
| American widgeon----- | 48 | 6.8 | 46 | 6.9 |
| Green-winged teal----- | 13 | 6.0 | 16 | 9.0 |
| Blue-winged teal----- | -- | -- | -- | -- |
| Shoveler----- | 18 | 7.7 | 1 | 6.0 |
| Pintail----- | 56 | 5.4 | 23 | 6.1 |
| Subtotal----- | | | | |
| Divers: | | | | |
| Redhead----- | 1 | 8.0 | -- | -- |
| Canvasback----- | 36 | 5.9 | 3 | 8.0 |
| Scaup----- | 73 | 6.0 | 17 | 8.0 |
| Ring-necked duck----- | -- | -- | -- | -- |
| Goldeneye----- | 1 | 7.0 | 4 | 6.0 |
| Bufflehead----- | 21 | 4.9 | 11 | 6.0 |
| Subtotal----- | | | | |
| Miscellaneous: | | | | |
| Scoter----- | 1 | 5.0 | -- | -- |
| Total ducks----- | 284 | 6.0 | 139 | 6.8 |

TABLE F-2.--Comparison of nesting densities on the Kashunuk River study area, Alaska, 1961-63

| Species | 1961 | 1962 | 1963 |
|-----------------------|------------|------------|------------|
| Ducks: | | | |
| Pintail----- | 7 | 3 | 5 |
| Greater scaup----- | -- | 1 | 1 |
| Oldsquaw----- | -- | 2 | 3 |
| Steller's eider----- | 1 | 5 | 1 |
| Common eider----- | 2 | 1 | 1 |
| Spectacled eider----- | 36 | 26 | 22 |
| Subtotal----- | 46 | 38 | 33 |
| Geese: | | | |
| Cackling----- | 49 | 67 | 60 |
| Black brant----- | 260 | 332 | 293 |
| Emperor----- | -- | 1 | 1 |
| Unidentified----- | -- | 4 | 2 |
| Subtotal----- | 309 | 404 | 356 |
| Total----- | 355 | 442 | 389 |

TABLE F-3.--Results of aerial brood counts conducted in Northwest Territories and Yukon, 1963

| Strata and size | Date of coverage | Number of broods | | | Total broods | Single adults | Two adults (pairs) | Average size of broods | | | Groups of 3 to 10 ¹ | Percent change from 1961 |
|------------------------------|---------------------|------------------|----------|-----------|--------------|---------------|--------------------|------------------------|----------|-----------|--------------------------------|--------------------------|
| | | Class I | Class II | Class III | | | | Class I | Class II | Class III | | |
| Stratum 2 (31.5 sq. mi.)--- | July 17 | 7 | 29 | 38 | 74 | 77 | 66 | 5.9 | 5.4 | 4.4 | 59 | +470 |
| Stratum 3 (18 sq. mi.)----- | July 18 | 2 | 2 | 1 | 5 | 1 | 3 | 6.0 | 6.5 | 4.0 | 3 | + 25 |
| Stratum 4 (108 sq. mi.)---- | July 18-21 | 7 | 6 | -- | 13 | 16 | 12 | 6.6 | 4.8 | -- | 14 | - 30 |
| Stratum 6 (13.5 sq. mi.)--- | July 20 | 6 | 11 | 7 | 24 | 11 | 6 | 7.7 | 5.5 | 4.0 | 16 | + 26 |
| Stratum 7 (148.5 sq. mi.)-- | July 24-30 | 23 | 52 | 8 | 83 | 38 | 20 | 7.9 | 6.0 | 5.0 | 47 | - 27 |
| Stratum 8 (27 sq. mi.)----- | July 31 | 5 | 4 | 3 | 12 | 16 | 11 | 5.0 | 3.8 | 4.0 | 20 | - 54 |
| Stratum 10 (36 sq. mi.)----- | August 3 | 3 | 24 | 14 | 41 | 13 | 11 | 7.0 | 6.0 | 4.4 | 22 | - 40 |
| Total (382.5 sq. mi.) | July 17 to August 3 | 53 | 128 | 71 | 252 | 172 | 129 | 6.7 | 5.6 | 4.3 | 181 | - 6 |

¹ Possibly class III broods.

TABLE F-4.--Waterfowl brood and late-nesting indexes by stratum, compared with previous year and long-term averages, southern Alberta, July, 1962-63

[Index numbers in thousands]

| Species | Stratum | | | Total | | Average 1956 1963 | Percent Change from-- | |
|---------------------------------------|---------|-------|-------|-------|-------|-------------------------|--------------------------|---------|
| | A | B | C | 1962 | 1963 | | 1962 | Average |
| Broods: | | | | | | | | |
| Duck brood index----- | 51 | 134 | 17 | 131 | 202 | 239 | + 54 | -15 |
| Average brood size ¹ ----- | 6.0 | 6.3 | 4.7 | 5.6 | 6.2 | 5.9 | + 10 | + 5 |
| Coot brood index----- | 1 | 18 | 1 | 19 | 50 | | -- | -62 |
| Late nesting index ² ----- | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 1 | Trace | 1 | 2 | 2 | | | |
| Gadwall----- | 1 | -- | 1 | Trace | 2 | | | |
| American widgeon----- | Trace | -- | -- | -- | Trace | | | |
| Green-winged teal----- | -- | -- | -- | Trace | -- | | | |
| Blue-winged teal----- | Trace | -- | -- | Trace | Trace | | | |
| Shoveler----- | Trace | 1 | Trace | Trace | 1 | | | |
| Pintail----- | Trace | -- | -- | -- | Trace | | | |
| Subtotal----- | 2 | 1 | 2 | 2 | 5 | 9 | +250 | -44 |
| Divers: | | | | | | | | |
| Redhead----- | -- | -- | -- | Trace | -- | | | |
| Canvasback----- | -- | -- | -- | Trace | -- | | | |
| Scaup----- | Trace | Trace | 1 | 1 | 1 | | | |
| Ring-necked duck----- | -- | -- | -- | -- | -- | | | |
| Goldeneye----- | -- | -- | -- | -- | -- | | | |
| Bufflehead----- | -- | -- | -- | -- | -- | | | |
| Ruddy duck----- | -- | 2 | -- | 4 | 2 | | | |
| Subtotal----- | Trace | 2 | 1 | 5 | 3 | 10 | - 40 | -70 |
| Total----- | 2 | 3 | 3 | 7 | 8 | 19 | + 14 | -60 |

¹ Class II and III broods only.

² As indicated by adult pairs and singles.

TABLE F-5.--Long-term trend in waterfowl brood and late-nesting indexes by species, southern Alberta, July, 1956-63

[Index number in thousands]

| Species | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Broods: | | | | | | | | |
| Duck brood index----- | 250 | 337 | 377 | 224 | 183 | 212 | 131 | 202 |
| Average brood size ¹ ----- | 6.0 | 6.2 | 6.3 | 4.8 | 6.2 | 5.7 | 5.6 | 6.2 |
| Coot brood index----- | 62 | 75 | 107 | 29 | 44 | 48 | 19 | 19 |
| Late-nesting index ² : | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 6 | 4 | 5 | 8 | 3 | 1 | 2 | 2 |
| Gadwall----- | 1 | 2 | 2 | 6 | 1 | 1 | Trace | 2 |
| American widgeon----- | 1 | 1 | 2 | 1 | Trace | Trace | -- | Trace |
| Green-winged teal----- | -- | Trace | -- | 1 | -- | -- | Trace | -- |
| Blue-winged teal----- | 2 | 2 | 2 | 3 | 1 | 1 | Trace | Trace |
| Shoveler----- | 1 | 2 | 1 | 1 | 1 | Trace | Trace | 1 |
| Pintail----- | 1 | Trace | 1 | 2 | 1 | 1 | -- | Trace |
| Subtotal----- | 12 | 11 | 13 | 22 | 7 | 4 | 2 | 5 |
| Divers: | | | | | | | | |
| Redhead----- | Trace | Trace | Trace | 1 | Trace | -- | Trace | -- |
| Canvasback----- | Trace | 1 | -- | 1 | -- | -- | Trace | -- |
| Scaup----- | 12 | 10 | 11 | 11 | 3 | 3 | 1 | 1 |
| Ring-neck duck----- | -- | -- | -- | 1 | -- | Trace | -- | -- |
| Goldeneye----- | -- | Trace | Trace | Trace | -- | -- | -- | -- |
| Bufflehead----- | Trace | -- | Trace | 1 | -- | -- | -- | -- |
| Ruddy duck----- | 7 | 2 | 3 | 2 | 4 | 1 | 4 | 2 |
| Subtotal----- | 19 | 13 | 14 | 17 | 7 | 4 | 5 | 3 |
| Total----- | 31 | 24 | 27 | 39 | 14 | 8 | 7 | 8 |

¹ Class II and III broods only.

² As indicated by adult pairs and singles.

TABLE F-6.--Waterfowl fall production index, Washington, 1962-63

[Includes young]

| Region or habitat | Amount | Index | | Percent change from -- |
|----------------------------------|-----------------|---------|---------|------------------------|
| | | 1962 | 1963 | |
| Scabland and plateau potholes--- | 2,578 (sq. mi.) | 270,000 | 273,000 | + 1 |
| Northeast highlands----- | 8,520 (sq. mi.) | 94,000 | 83,000 | -12 |
| Central irrigation----- | 4,078 (sq. mi.) | 78,200 | 123,000 | +58 |
| Lakes----- | 232 | -- | -- | -- |
| Streams----- | 996 (mi.) | 10,300 | -- | -- |
| Western Washington----- | -- | 61,900 | 67,000 | + 8 |
| Total----- | -- | 515,000 | 556,000 | + 8 |

TABLE F-7.--Goose production trends, Oregon, 1960-63

| Transect | Total broods | | | | Total young | | | |
|------------------------|--------------|------|------|------|-------------|-------|-------|-------|
| | 1963 | 1962 | 1961 | 1960 | 1963 | 1962 | 1961 | 1960 |
| Klamath River----- | 194 | 149 | 185 | 168 | 871 | 744 | 834 | 756 |
| Klamath Marsh----- | 67 | 44 | 42 | 52 | 300 | 200 | 189 | 236 |
| Sprague River----- | 20 | 27 | 34 | 37 | 90 | 144 | 153 | 165 |
| Alkali Lake----- | 14 | 16 | 13 | 5 | 62 | 85 | 58 | 23 |
| Spring Lake----- | 14 | 9 | 10 | 11 | 65 | 49 | 46 | 50 |
| Nuss Lake----- | 16 | 19 | 49 | 26 | 71 | 104 | 221 | 119 |
| Agency Lake----- | 22 | 13 | 43 | 43 | 97 | 78 | 192 | 194 |
| Wocus Bay----- | 26 | 30 | 35 | 29 | 118 | 164 | 156 | 133 |
| Howard Bay----- | 4 | 43 | -- | -- | 17 | 195 | -- | -- |
| Summer Lake----- | 55 | 46 | 63 | 55 | 243 | 205 | 261 | 265 |
| Silver Lake----- | -- | -- | 68 | 57 | -- | -- | 284 | 236 |
| Abert Lake----- | 26 | 22 | 14 | 18 | 131 | 98 | 57 | 87 |
| Columbia River----- | 11 | 6 | 10 | 5 | 48 | 36 | 42 | 28 |
| Wickiup Reservoir----- | 10 | 11 | -- | -- | 36 | 52 | -- | -- |
| Malheur Refuge----- | 278 | 244 | -- | -- | 1,250 | 1,100 | -- | -- |
| Totals----- | 757 | 679 | 566 | 506 | 3,399 | 3,254 | 2,493 | 2,292 |

TABLE F-8.--Duck production trends, by areas, Oregon, 1960-63

| Transect | Square miles | Total broods | | | | Total young | | | |
|-----------------------|--------------|--------------|------|------|------|-------------|-------|-------|-------|
| | | 1963 | 1962 | 1961 | 1960 | 1963 | 1962 | 1961 | 1960 |
| Klamath Basin----- | 37 | 287 | 396 | 431 | 452 | 1,750 | 2,836 | 3,214 | 3,052 |
| Summer Lake----- | 1 | 114 | 99 | 115 | 71 | 939 | 704 | 806 | 591 |
| N. Lake County----- | 5 | 35 | 27 | 23 | 35 | 274 | 179 | 144 | 288 |
| Umatilla County----- | 4 | 15 | 22 | 10 | 8 | 93 | 133 | 64 | 44 |
| Jefferson County----- | 1 | 12 | 7 | 10 | 10 | 68 | 38 | 75 | 75 |
| Malheur County----- | 60 | 90 | 75 | 82 | 78 | 524 | 505 | 474 | 445 |
| G. I. Ranch----- | 1 | 21 | 7 | 16 | -- | 162 | 62 | 127 | -- |
| Totals----- | 109 | 574 | 633 | 687 | 654 | 3,810 | 4,457 | 4,904 | 4,495 |

TABLE F-9.--Duck production by species, Oregon, 1960-63

[Comparative trends on 108.7 square miles]

| Species | Number of broods | | | | Number of young | | | |
|-------------------------------------|------------------|------|------|------|-----------------|-------|-------|-------|
| | 1960 | 1961 | 1962 | 1963 | 1960 | 1961 | 1962 | 1963 |
| Ducks: | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 98 | 169 | 121 | 165 | 696 | 989 | 763 | 1,068 |
| Gadwall----- | 57 | 44 | 64 | 67 | 441 | 333 | 452 | 551 |
| American widgeon----- | -- | -- | -- | 1 | -- | -- | -- | 7 |
| Blue-winged teal ¹ ----- | 47 | 65 | 171 | 110 | 345 | 431 | 1,239 | 718 |
| Shoveller----- | 2 | 2 | 3 | 4 | 16 | 11 | 17 | 25 |
| Wood Duck----- | -- | 1 | 3 | -- | -- | 6 | 20 | -- |
| Pintail----- | 19 | 14 | 31 | 24 | 136 | 85 | 221 | 153 |
| Subtotal----- | 223 | 295 | 393 | 371 | 1,634 | 1,855 | 2,712 | 2,522 |
| Divers: | | | | | | | | |
| Redhead----- | 189 | 120 | 79 | 82 | 1,335 | 873 | 587 | 604 |
| Canvasback----- | -- | -- | 6 | 4 | -- | -- | 44 | 21 |
| Scaup----- | 22 | 9 | 14 | 6 | 130 | 54 | 101 | 33 |
| Ruddy duck----- | 100 | 227 | 138 | 102 | 645 | 1,903 | 927 | 559 |
| Subtotal----- | 311 | 356 | 237 | 194 | 2,110 | 2,830 | 1,659 | 1,217 |
| Miscellaneous: | | | | | | | | |
| Merganser----- | -- | -- | -- | 3 | -- | -- | -- | 33 |
| Unidentified ----- | 120 | 20 | 9 | 6 | 751 | 92 | 72 | 38 |
| Total----- | 654 | 671 | 639 | 574 | 4,495 | 4,777 | 4,443 | 3,810 |

¹ Includes cinnamon teal.

TABLE F-10.--Fall waterfowl population indexes, by species and area, California, 1963

| Species | Sacramento Valley | Suisun Marsh | North San Joaquin Valley | South San Joaquin Valley | North-eastern California | Klamath Basin | Total |
|---------------------------|-------------------|--------------|--------------------------|--------------------------|--------------------------|---------------|---------|
| Ducks: | | | | | | | |
| Dabblers: | | | | | | | |
| Mallard----- | 78,350 | 3,330 | 3,640 | 1,500 | 38,030 | 12,890 | 137,740 |
| Gadwall----- | 50 | 1,500 | 1,670 | -- | 7,020 | 15,600 | 25,840 |
| Cinnamon teal----- | 4,820 | 1,050 | 2,700 | 390 | 7,090 | 2,390 | 18,440 |
| Shoveler----- | -- | 310 | 410 | -- | 1,920 | 2,200 | 4,840 |
| Pintail----- | 1,200 | -- | 190 | 30 | 14,150 | 7,240 | 22,810 |
| Subtotal----- | 84,420 | 6,190 | 8,610 | 1,920 | 68,210 | 40,320 | 209,670 |
| Divers: | | | | | | | |
| Redhead----- | 1,300 | -- | 560 | 60 | 6,810 | 13,460 | 22,190 |
| Scaup----- | 230 | -- | -- | -- | 1,490 | 2,100 | 3,820 |
| Ruddy----- | 1,790 | -- | 500 | 60 | 1,150 | 7,230 | 10,730 |
| Subtotal----- | 3,320 | -- | 1,060 | 120 | 9,450 | 22,790 | 36,740 |
| Miscellaneous----- | 280 | 540 | -- | -- | 900 | 14,830 | 16,550 |
| Total ducks----- | 88,020 | 6,730 | 9,670 | 2,040 | 78,560 | 77,940 | 262,960 |
| Canada goose----- | -- | -- | -- | -- | 18,650 | 7,060 | 25,710 |
| Coots----- | 85,340 | 1,750 | 11,720 | 4,200 | 12,480 | 15,620 | 131,110 |

TABLE F-11.--Nesting pair and fall population estimates, by species, California 1960-63

| Species | Nesting pairs | | | | Fall population index ¹ | | | |
|---------------------------|---------------|--------|--------|--------|------------------------------------|---------|---------|---------|
| | 1960 | 1961 | 1962 | 1963 | 1960 | 1961 | 1962 | 1963 |
| Ducks: | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 40,500 | 33,110 | 22,700 | 29,490 | 179,310 | 140,420 | 95,830 | 137,740 |
| Gadwall----- | 3,850 | 3,930 | 2,820 | 5,300 | 24,760 | 19,120 | 21,900 | 25,840 |
| Cinnamon teal----- | 5,870 | 4,080 | 3,350 | 4,380 | 22,740 | 15,590 | 17,340 | 18,440 |
| Shoveler----- | 820 | 620 | 825 | 1,340 | 7,140 | 4,120 | 3,900 | 4,840 |
| Pintail----- | 1,760 | 2,160 | 2,275 | 5,690 | 10,870 | 10,420 | 12,900 | 22,810 |
| Subtotal----- | 52,800 | 43,900 | 32,420 | 46,200 | 244,820 | 189,670 | 151,870 | 209,670 |
| Divers: | | | | | | | | |
| Redhead----- | 3,330 | 2,740 | 2,180 | 4,990 | 21,280 | 15,050 | 19,460 | 22,190 |
| Scaup----- | 770 | 720 | 590 | 640 | 5,390 | 3,840 | 2,170 | 3,820 |
| Ruddy duck----- | 3,040 | 3,580 | 2,830 | 2,250 | 13,350 | 11,460 | 20,080 | 10,730 |
| Subtotal----- | 7,140 | 7,040 | 5,600 | 7,880 | 40,020 | 30,350 | 41,710 | 36,740 |
| Miscellaneous----- | 600 | 700 | 350 | 3,280 | 3,730 | 3,370 | 2,020 | 16,550 |
| Total ducks----- | 60,540 | 51,640 | 38,370 | 57,360 | 288,570 | 223,390 | 195,600 | 262,960 |
| Canada goose----- | 1,620 | 1,890 | 1,780 | 2,410 | 18,570 | 19,790 | 18,490 | 25,710 |
| Coots----- | 13,880 | 31,320 | 18,980 | 26,980 | 75,210 | 156,500 | 92,130 | 131,110 |

¹ Includes young and resident adults.

TABLE F-12.--Trend in number of young produced on key areas, by species,
Nevada, 1959-63

| Species | 1959 | 1960 | 1961 | 1962 | 1963 | Percent change from 1962 |
|------------------------|-------|-------|-------|-------|-------|--------------------------------|
| Ducks: | | | | | | |
| Dabblers: | | | | | | |
| Mallard----- | 622 | 465 | 585 | 724 | 729 | + .7 |
| Gadwall----- | 863 | 456 | 390 | 429 | 523 | +22 |
| American widgeon----- | 20 | 16 | 27 | 8 | -- | -- |
| Green-winged teal----- | -- | -- | -- | -- | 63 | -- |
| Cinnamon teal----- | 798 | 544 | 406 | 517 | 349 | -32 |
| Shoveler----- | 13 | 18 | 8 | 50 | 46 | -8 |
| Pintail----- | 142 | 94 | 56 | 323 | 349 | +8 |
| Subtotal----- | 2,458 | 1,593 | 1,472 | 2,051 | 2,059 | + .3 |
| Divers: | | | | | | |
| Redhead----- | 2,644 | 371 | 118 | 434 | 689 | +58 |
| Canvasback----- | -- | 55 | 66 | 79 | 170 | +128 |
| Scaup----- | 37 | 50 | 15 | 18 | 23 | +28 |
| Ruddy duck----- | 678 | 55 | 68 | 195 | 128 | -34 |
| Subtotal----- | 3,359 | 531 | 267 | 726 | 1,010 | +39 |
| Total ducks----- | 5,817 | 2,124 | 1,759 | 2,777 | 3,069 | +10 |
| Canada goose----- | 605 | 596 | 541 | 848 | 615 | -27 |

TABLE F-13.--Duck broods by species, all age classes, Nevada, 1962-63

| Species | 1962 | | 1963 | |
|-----------------------|------------------|--------------|------------------|--------------|
| | Number of broods | Average size | Number of broods | Average size |
| Dabblers: | | | | |
| Mallard----- | 118 | 6.1 | 108 | 6.7 |
| Gadwall----- | 58 | 7.4 | 77 | 6.8 |
| American widgeon----- | 1 | 8.0 | -- | -- |
| Green-wing teal----- | -- | -- | 11 | 5.7 |
| Cinnamon teal----- | 86 | 6.0 | 50 | 7.0 |
| Shoveler----- | 8 | 6.2 | 7 | 6.6 |
| Pintail----- | 55 | 5.9 | 52 | 6.7 |
| Subtotal----- | 326 | -- | 305 | -- |
| Divers: | | | | |
| Redhead----- | 70 | 6.2 | 98 | 7.0 |
| Canvasback----- | 14 | 5.6 | 26 | 6.5 |
| Scaup----- | 3 | 6.0 | 4 | 5.7 |
| Ruddy duck----- | 36 | 5.4 | 26 | 4.9 |
| Subtotal----- | 123 | -- | 154 | -- |
| Total | 449 | -- | 459 | -- |

TABLE F-14.--Canada goose production, Utah, 1959-63

| Area | Number of broods | | | | | Number of young | | | | |
|-------------------------------------|------------------|------|------|------|----------------|-----------------|-------|-------|-------|-------|
| | 1959 | 1960 | 1961 | 1962 | 1963 | 1959 | 1960 | 1961 | 1962 | 1963 |
| Cutler Reservoir----- | 20 | 27 | 37 | 18 | 26 | 95 | 122 | 180 | 82 | 147 |
| Public shooting grounds----- | 11 | 20 | 20 | 26 | 32 | 57 | 99 | 84 | 140 | 161 |
| Bear River Refuge and vicinity----- | 261 | 341 | 440 | 425 | 446 | 1,203 | 1,568 | 2,112 | 2,100 | 2,167 |
| Ogden Bay Refuge----- | 76 | 78 | 70 | 68 | 85 | 334 | 412 | 310 | 320 | 408 |
| Farmington Bay Refuge----- | 39 | 40 | 47 | 62 | 65 | 225 | 192 | 250 | 277 | 341 |
| Scipio Reservoir----- | 3 | 1 | 3 | 5 | 5 | 16 | 4 | 13 | 28 | 23 |
| Fool's Creek Reservoir----- | 6 | 6 | Dry | -- | Dry | 32 | 31 | Dry | -- | Dry |
| Redmond Lake----- | 6 | 12 | 12 | 12 | 12 | 32 | 72 | 72 | 66 | 60 |
| Gunnison Reservoir----- | 10 | 8 | 2 | 7 | 8 | 48 | 41 | 13 | 31 | 38 |
| Clear Lake Refuge----- | 2 | -- | 5 | 4 | 5 | 9 | -- | 24 | 21 | 26 |
| Mona Reservoir----- | 7 | -- | 6 | 6 | 2 ¹ | 32 | -- | 31 | 27 | 10 |
| Wales Reservoir----- | 7 | 11 | 12 | 6 | 18 | 37 | 62 | 70 | 31 | 76 |
| Rich Co. (Bear River)----- | 37 | 41 | 50 | 76 | 91 | 172 | 179 | 257 | 328 | 422 |
| Kooshaerm Reservoir----- | 4 | 7 | 6 | 9 | 5 | 18 | 35 | 35 | 40 | 21 |
| Bicknell Bottoms----- | 4 ¹ | 10 | 11 | 13 | 9 | 21 | 51 | 63 | 68 | 38 |
| Total----- | 493 | 602 | 721 | 737 | 809 | 2,331 | 2,868 | 3,514 | 3,559 | 3,938 |

¹ Incomplete count.

TABLE F-15.--Trend in number of young produced on Canada goose nesting units, Idaho, 1955-63

| Nesting unit | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | Percent change from 1962 |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|------------------|-------|--------------------------|
| Southwestern Idaho: | | | | | | | | | | |
| Homedale----- | 601 | 627 | 1,030 | 798 | 541 | 863 | 769 | 882 | 1,116 | +27 |
| Payette River----- | -- | -- | -- | -- | 325 | 522 | 383 | 583 | 711 | +22 |
| Southeastern Idaho: | | | | | | | | | | |
| Blackfoot Reservoir---- | 387 | 323 | 201 | 267 | 274 | 313 | 250 | 336 ¹ | 483 | +44 |
| Island Park Reservoir-- | 52 | 185 | 95 | 121 | 179 | 206 | 130 | 117 | 128 | + 9 |
| North Fork Snake River-- | 94 | 152 | 136 | 145 | 213 | 148 | 124 | 180 | 149 | -17 |
| North Lake----- | 130 | 173 | 118 | 121 | 115 | 136 | 132 | 22 | 33 | +50 |
| Total----- | 1,264 | 1,460 | 1,580 | 1,452 | 1,647 | 2,120 | 1,788 | 2,120 | 2,620 | +24 |

¹ Blackfoot Reservoir adjusted to habitat conditions.

TABLE F-16.--Number of broods, by species, observed on trend routes in southeastern Idaho, 1955-63

| Species | 1955 | 1956 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|---|------|------|------|------|------|------|------|------|
| Camas Refuge: ¹ | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 6 | 19 | 14 | 14 | 9 | 21 | 16 | 9 |
| Gadwall----- | 8 | 7 | 5 | 3 | 2 | -- | 7 | 4 |
| American widgeon----- | -- | 3 | 1 | 2 | 3 | 2 | 12 | 1 |
| Green-winged teal----- | -- | -- | 1 | 1 | 4 | 7 | -- | 1 |
| Blue-winged & cinnamon teal-- | 3 | 1 | 3 | 7 | -- | 6 | 6 | 5 |
| Pintail----- | 2 | 4 | 3 | 3 | 2 | 7 | 6 | 1 |
| Shoveler----- | 2 | 1 | 2 | 2 | -- | 1 | 7 | 3 |
| Subtotal----- | 21 | 35 | 29 | 32 | 20 | 44 | 54 | 24 |
| Divers: | | | | | | | | |
| Redhead----- | 3 | 14 | 10 | 9 | 2 | 1 | 12 | 9 |
| Canvasback----- | -- | -- | 1 | 2 | 1 | -- | -- | 2 |
| Lesser scaup----- | 5 | 6 | 7 | -- | 1 | 1 | 3 | 8 |
| Ruddy duck----- | -- | 4 | 1 | -- | -- | 3 | 5 | 1 |
| Subtotal----- | 8 | 24 | 19 | 11 | 4 | 5 | 20 | 20 |
| Unidentified----- | 9 | 30 | 8 | 11 | 4 | 3 | 4 | -- |
| Total----- | 38 | 89 | 56 | 54 | 28 | 52 | 78 | 44 |
| Blackfoot Reservoir:^{1 2} | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 12 | 8 | 28 | 30 | 35 | -- | 10 | 49 |
| Gadwall----- | 23 | 41 | 54 | 15 | 23 | -- | 58 | 76 |
| American widgeon----- | 6 | 11 | 10 | 18 | 2 | -- | 24 | 24 |
| Green-winged teal----- | 1 | -- | 1 | 7 | 1 | -- | 1 | 1 |
| Blue-winged & cinnamon teal-- | 7 | 3 | 2 | 4 | 10 | -- | -- | -- |
| Pintail----- | 2 | -- | 8 | 20 | 16 | -- | 4 | 6 |
| Shoveler----- | -- | -- | -- | -- | -- | -- | 1 | -- |
| Subtotal----- | 51 | 63 | 103 | 94 | 87 | -- | 98 | 156 |
| Divers: | | | | | | | | |
| Redhead----- | 3 | -- | 1 | 1 | 3 | -- | 1 | 1 |
| Canvasback----- | -- | -- | -- | -- | -- | -- | -- | -- |
| Lesser scaup----- | 6 | 12 | 8 | 2 | 2 | -- | -- | 3 |
| Ruddy duck----- | -- | -- | -- | -- | -- | -- | -- | -- |
| Subtotal----- | 9 | 12 | 9 | 4 | 5 | -- | 1 | 4 |
| Unidentified----- | 5 | 4 | 13 | 14 | 38 | -- | 2 | 1 |
| Total----- | 65 | 79 | 125 | 112 | 130 | -- | 101 | 161 |

¹ No routes were censused in 1957.

² Water levels too low in 1961 to permit operation of trend route.

TABLE F-17.--Waterfowl brood and late-nesting indexes by stratum compared to previous year and long-term average, Southern Saskatchewan, 1962-1963

[Index numbers in thousands]

| Species | Stratum | | | | | Total | | Average 1958 to 1962 | Percent change from-- | |
|---------------------------------------|---------|--------|--------|--------|-----|-------|------|----------------------------|--------------------------|---------|
| | A-East | A-West | B-East | B-West | C : | 1962 | 1963 | | 1962 | Average |
| Broods: | | | | | | | | | | |
| Duckbrood index----- | 4.9 | 12.1 | 11.3 | 13.2 | 4.3 | 32.8 | 45.8 | 248.6 ³ | + 39.6 | - 81.6 |
| Average brood size ¹ ----- | 5.4 | 4.9 | 6.3 | 5.5 | 4.3 | 4.9 | 5.4 | 5.1 ³ | + 10.2 | + 5.9 |
| Coot brood index----- | 0.5 | -- | 3.1 | 1.6 | -- | 0.1 | 5.2 | 40.6 ³ | +1,000.0 | - 87.2 |
| Late-nesting index ² : | | | | | | | | | | |
| Dabblers: | | | | | | | | | | |
| Mallard----- | 2.4 | 10.6 | 3.5 | 3.9 | 2.7 | 8.5 | 23.1 | 47.4 | + 100.0 | - 51.3 |
| Gadwall----- | 1.4 | 3.0 | 2.7 | 1.4 | 1.2 | 2.1 | 9.7 | 5.8 | + 300.0 | + 67.2 |
| American widgeon----- | 1.1 | 0.6 | 0.8 | 0.8 | 0.2 | 2.1 | 3.5 | 6.6 | + 66.6 | - 47.0 |
| Green-winged teal----- | -- | 0.5 | -- | 0.4 | -- | -- | 0.9 | 0.6 | + -- | + 50.0 |
| Blue-winged teal----- | 1.1 | 3.1 | 1.6 | 2.1 | 0.2 | 1.3 | 8.1 | 13.6 | + 500.0 | - 40.4 |
| Shoveler----- | 0.3 | 1.5 | -- | 0.4 | 0.9 | 0.4 | 3.1 | 3.2 | + 600.0 | - 3.1 |
| Pintail----- | 0.8 | 1.5 | 1.9 | 1.8 | 0.5 | 3.8 | 6.5 | 5.6 | + 71.1 | + 16.1 |
| Subtotal----- | 7.1 | 20.8 | 10.5 | 10.8 | 5.7 | 18.2 | 54.9 | 82.9 | + 201.6 | - 33.8 |
| Divers: | | | | | | | | | | |
| Redhead----- | -- | 1.2 | -- | 0.4 | -- | 0.2 | 1.6 | 1.4 | + 700.0 | + 14.3 |
| Canvasback----- | -- | 0.6 | -- | -- | -- | -- | 0.6 | 1.4 | + -- | - 57.1 |
| Scaup----- | 0.3 | 1.5 | 0.8 | -- | 0.2 | 0.4 | 2.8 | 7.4 | + 600.0 | - 62.2 |
| Ring-necked duck----- | 0.3 | 0.2 | 1.5 | -- | 0.3 | 0.2 | 2.3 | 0.8 | + 1000.0 | + 187.5 |
| Goldeneye----- | -- | -- | -- | -- | -- | -- | -- | 0.4 | -- | -- |
| Bufflehead----- | -- | -- | -- | -- | -- | -- | -- | 0.3 | -- | -- |
| Ruddy----- | 0.8 | 1.0 | 1.2 | 1.0 | -- | 0.8 | 4.0 | 6.2 | + 400.0 | - 35.5 |
| Subtotal----- | 1.4 | 4.5 | 3.5 | 1.4 | 0.5 | 1.6 | 11.3 | 18.0 | + 606.3 | - 37.2 |
| Miscellaneous ducks----- | -- | -- | 1.2 | 0.2 | -- | -- | 1.4 | 0.6 | + -- | + 133.3 |
| Total----- | 8.5 | 25.3 | 15.2 | 12.4 | 6.2 | 19.8 | 67.6 | 101.4 | + 241.4 | - 33.3 |

¹ Class II and III broods only.

² As indicated by adult pairs and singles.

³ 11-year average - 1952 to 1962.

TABLE F-18.--Long-term trend in July waterfowl brood and late-nesting indexes by species,
southern Saskatchewan, 1958-63

[Index numbers in thousands]

| Species | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|---------------------------------------|-------|-------|-------|------|------|------|
| Broods: | | | | | | |
| Duckbrood index----- | 253.1 | 105.8 | 125.8 | 68.7 | 32.8 | 45.8 |
| Average brood size ¹ ----- | 4.3 | 3.7 | 3.8 | 4.4 | 4.9 | 5.4 |
| Coot brood index----- | 21.6 | 5.4 | 14.8 | 6.0 | 0.1 | 5.2 |
| Late-nesting index ² : | | | | | | |
| Dabblers: | | | | | | |
| Mallard----- | 87.5 | 45.0 | 76.6 | 19.6 | 8.5 | 23.1 |
| Gadwall----- | 8.0 | 3.5 | 14.8 | 0.8 | 2.1 | 9.7 |
| American widgeon----- | 10.9 | 8.5 | 10.7 | 0.8 | 2.1 | 3.5 |
| Green-winged teal----- | 1.8 | 0.7 | 0.5 | -- | -- | 0.9 |
| Blue-winged teal----- | 23.7 | 21.0 | 20.6 | 1.4 | 1.3 | 8.1 |
| Shoveler----- | 5.2 | 1.7 | 7.5 | 1.2 | 0.4 | 3.1 |
| Pintail----- | 15.2 | 2.1 | 5.4 | 1.6 | 3.8 | 6.5 |
| Subtotal----- | 152.3 | 82.5 | 136.1 | 25.4 | 18.2 | 54.9 |
| Divers: | | | | | | |
| Redhead----- | 3.8 | 0.5 | 2.7 | -- | 0.2 | 1.6 |
| Canvasback----- | 3.5 | 2.1 | 0.5 | 1.0 | -- | 0.6 |
| Scaup----- | 16.4 | 6.1 | 9.4 | 4.8 | 0.4 | 2.8 |
| Ring-necked duck----- | 1.3 | 1.0 | -- | 1.6 | 0.2 | 2.3 |
| Goldeneye----- | -- | 0.6 | 1.2 | -- | -- | -- |
| Bufflehead----- | -- | 0.1 | -- | 1.2 | -- | -- |
| Ruddy----- | 10.5 | 9.8 | 9.6 | 0.5 | 0.8 | 4.0 |
| Subtotal----- | 35.5 | 20.2 | 23.4 | 9.1 | 1.6 | 11.3 |
| Unidentified----- | 0.4 | 1.0 | 1.4 | -- | -- | 1.4 |
| Total----- | 188.2 | 103.7 | 160.9 | 34.5 | 19.8 | 67.6 |

¹ Class II-and III broods only.

² As indicated by adult pairs and singles.

TABLE F-19.--Canada goose production by areas,¹ Montana, 1959-63

| | Hi-Line | Helena | Great Falls-Piedmont | Total |
|-------------------------------------|--------------------|--------|----------------------|-------|
| Adults without young: | | | | |
| 1959----- | ² 14 | 96 | 56 | -- |
| 1960----- | 74 | 48 | 35 | 157 |
| 1961----- | 8 | 73 | 28 | 109 |
| 1962----- | 53 | 73 | 41 | -- |
| 1963----- | 242 | 124 | -- | 366 |
| Adults with young: | | | | |
| 1959----- | ² 303 | 112 | 46 | -- |
| 1960----- | 728 | 153 | 22 | 903 |
| 1961----- | 367 | 74 | 28 | 469 |
| 1962----- | 309 | 74 | 50 | -- |
| 1963----- | 768 | 126 | -- | 894 |
| Number of young: | | | | |
| 1959----- | ² 679 | 285 | 97 | -- |
| 1960----- | 1,519 | 285 | 44 | 1,848 |
| 1961----- | 861 | 317 | 67 | 1,245 |
| 1962----- | 744 | 317 | 131 | -- |
| 1963----- | 2,079 | 335 | -- | 2,414 |
| Total: | | | | |
| 1959----- | ² 1,466 | 493 | 199 | -- |
| 1960----- | 2,321 | 486 | 101 | 2,908 |
| 1961----- | 1,236 | 464 | 123 | 1,823 |
| 1962----- | 1,106 | 464 | 222 | 1,792 |
| 1963----- | 3,089 | 585 | -- | 3,674 |
| Percent change, 1963 from 1962----- | +179 | +26 | -- | +105 |

¹ Data for Great Falls-Piedmont and East Slope not included for lack of comparability.
The 1959 census was not complete. Total numbers indicated are those estimated by the banding crew prior to banding.

TABLE F-20.--Waterfowl brood and late-nesting indexes by stratum compared to previous year and long-term averages, North Dakota, South Dakota, and western Minnesota, 1963

[Index numbers in thousands]

| Species | Stratum | | | Total | | Average 1959-63 | Percent change from-- | |
|---------------------------------------|---------|---------|------|-------|-------|--------------------|--------------------------|---------|
| | East | Central | West | 1962 | 1963 | | 1962 | Average |
| Broods: | | | | | | | | |
| Ducks brood index----- | 32.2 | 54.3 | 21.6 | 74.6 | 108.1 | 69.0 | + 45 | + 56 |
| Average brood size ¹ ----- | 5.7 | 4.7 | 5.2 | 3.4 | 5.2 | 4.7 | -- | -- |
| Coot brood index----- | 1.8 | 2.5 | -- | 4.2 | 4.4 | 3.6 | + 3 | + 21 |
| Late-nesting index: ² | | | | | | | | |
| Dabblers: | | | | | | | | |
| Mallard----- | 7.3 | 16.2 | 7.3 | 47.2 | 30.8 | 30.9 | - 35 | - 0.3 |
| Gadwall----- | 1.2 | 8.9 | -- | 14.0 | 10.1 | 6.8 | - 28 | + 48 |
| American widgeon----- | -- | 1.3 | -- | .5 | 1.3 | .6 | +133 | +119 |
| Green-winged teal----- | -- | .4 | -- | -- | .4 | .1 | -- | +150 |
| Blue-winged teal----- | 4.9 | 10.5 | 2.0 | 48.7 | 17.4 | 19.1 | - 64 | - 9 |
| Shoveler----- | -- | -- | -- | 2.2 | -- | .5 | -- | -- |
| Pintail----- | -- | 1.3 | 2.0 | 11.2 | 3.3 | 5.5 | - 70 | - 40 |
| Subtotal----- | 13.4 | 38.6 | 11.3 | 123.8 | 63.3 | 63.5 | - 50 | - .4 |
| Divers: | | | | | | | | |
| Redhead----- | 3.0 | 1.6 | -- | 7.7 | 4.7 | 3.0 | - 39 | + 55 |
| Canvasback----- | -- | -- | -- | -- | -- | .2 | -- | -- |
| Scaup----- | -- | -- | -- | 1.9 | -- | .5 | -- | -- |
| Ring-necked duck----- | -- | -- | -- | -- | -- | .9 | -- | -- |
| Ruddy duck----- | 1.2 | 15.2 | -- | 8.4 | 16.4 | 8.4 | + 95 | + 97 |
| Subtotal----- | 4.2 | 16.8 | -- | 18.0 | 21.1 | 13.0 | + 17 | + 62 |
| Total----- | 17.6 | 55.4 | 11.3 | 141.8 | 84.4 | 76.5 | - 40 | + 10 |

¹ Class II and III broods only.

² As indicated by adult pairs and singles.

TABLE F-21.--Long-term trend in July waterfowl brood and late-nesting indexes by species, North Dakota, South Dakota, and western Minnesota, 1963

[Index numbers in thousands]

| Species | 1959 | 1960 | 1961 | 1962 | 1963 |
|---|------|------|------|-------|-------|
| Broods: | | | | | |
| Duck brood index----- | 22.7 | 79.2 | 60.7 | 74.5 | 108.1 |
| Average brood size ¹ ----- | 4.6 | 5.2 | 5.4 | 3.4 | 5.2 |
| Coot brood index----- | 1.6 | 4.8 | 3.0 | 4.2 | 4.4 |
| Late-nesting index: ² | | | | | |
| Dabblers: | | | | | |
| Mallard----- | 17.9 | 44.4 | 14.0 | 47.2 | 30.8 |
| Gadwall----- | .5 | 6.5 | 3.1 | 14.0 | 10.1 |
| American widgeon----- | -- | .4 | .7 | .5 | 1.3 |
| Green-winged teal----- | -- | -- | .4 | -- | .4 |
| Blue-winged teal----- | 3.6 | 15.1 | 10.6 | 48.7 | 17.4 |
| Shoveler----- | -- | .4 | -- | 2.2 | -- |
| Pintail----- | 1.3 | 6.3 | 5.3 | 11.2 | 3.3 |
| Subtotal----- | 23.3 | 73.1 | 34.1 | 123.8 | 63.3 |
| Divers: | | | | | |
| Redhead----- | -- | 2.0 | .7 | 7.7 | 4.7 |
| Canvasback----- | .5 | .4 | .4 | -- | -- |
| Scaup----- | -- | -- | .6 | 1.9 | -- |
| Ring-necked duck----- | -- | 4.7 | -- | -- | -- |
| Ruddy duck----- | 1.6 | 8.1 | 7.2 | 8.4 | 16.5 |
| Subtotal----- | 2.1 | 15.2 | 8.9 | 18.0 | 21.2 |
| Total----- | 25.4 | 88.3 | 43.0 | 141.8 | 84.5 |

¹ Class II and III broods only.

² As indicated by adult pairs and singles.

TABLE F-22.--Waterfowl production and water indexes; North Dakota, 1963

| Transects | Number of square miles | Number of duck broods | Number of water areas |
|--------------------------|------------------------|-----------------------|-----------------------|
| Test Run----- | 7.5 | 32 | 19 |
| Antelope Lakes----- | 8.3 | 1 | 11 |
| Drake-Anamoose----- | 8.8 | 3 | 26 |
| Hurdsfield-Chaseley----- | 8.0 | 7 | 50 |
| Cleveland-Woodworth----- | 7.0 | 35 | 36 |
| Medina-Gackle----- | 7.0 | 49 | 38 |
| Douglas----- | 8.2 | 11 | 32 |
| Snake Creek----- | 7.0 | 8 | 19 |
| Leeds Circuit----- | 7.5 | 2 | 27 |
| Leeds-Maza----- | 7.8 | -- | 34 |
| Rugby, north----- | 7.5 | 5 | 14 |
| Rugby, south----- | 7.5 | -- | 66 |
| Totals----- | 92.1 | 153 | 372 |
| Brood index----- | -- | 1.66 | -- |
| Water index----- | -- | -- | 4.04 |

**TABLE F-23.--Distribution of duck broods by age class,
North Dakota, mid-July, 1955-1963**

| Age class ¹ | Percent of total | | |
|------------------------|-------------------|------|------|
| | 1955-1962 average | 1962 | 1963 |
| Class I: | | | |
| a----- | 25.6 | 19.7 | 16.3 |
| b----- | 21.3 | 29.5 | 22.2 |
| c----- | 15.4 | 11.5 | 20.3 |
| Total----- | 62.3 | 60.7 | 58.8 |
| Class II: | | | |
| a----- | 13.7 | 21.3 | 15.7 |
| b----- | 9.4 | 3.3 | 11.1 |
| c----- | 9.3 | 8.2 | 11.8 |
| Total----- | 32.4 | 32.8 | 38.6 |
| Class III: | | | |
| a----- | 5.3 | 6.5 | 2.6 |

¹ Based on "A Guide for Aging Duck Broods in the Field", by Gollop and Marshall, May, 1954.

**TABLE F-24.--Species composition of the duck broods observed
during the mid-July surveys in North Dakota, 1955 through 1963.**

| Species | Percent of total | | |
|------------------------|-------------------|------|------|
| | 1955-1962 average | 1962 | 1963 |
| Dabblers: | | | |
| Mallard----- | 17.8 | 19.7 | 15.0 |
| Gadwall----- | 14.4 | 19.7 | 12.4 |
| American widgeon----- | 1.5 | 3.3 | 2.0 |
| Green-winged teal----- | -- | -- | 0.7 |
| Blue-winged teal----- | 36.3 | 24.6 | 30.7 |
| Shoveler----- | 6.4 | 14.7 | 10.5 |
| Pintail----- | 15.4 | 13.1 | 12.4 |
| Divers: | | | |
| Redhead----- | 2.1 | -- | 5.2 |
| Canvasback----- | 4.7 | 4.9 | 11.1 |
| Scaup----- | 0.2 | -- | -- |
| Ruddy----- | 1.2 | -- | -- |

TABLE F-25.--Aerial duck production data, Nebraska Sandhills, 1963

| | Stratum | | Total |
|------------------------------|---------|-------|--------|
| | A | B | |
| Number of Transects----- | 48 | 16 | 64 |
| Square miles sampled----- | 108 | 36 | 144 |
| Square miles in stratum----- | 10,869 | 5,363 | 16,232 |
| Number of broods seen----- | 75 | 33 | 108 |
| Brood index/sq. mi.----- | 1.42 | 1.09 | 1.33 |

TABLE F-26.--Duck broods composition, aerial survey, Nebraska Sandhills, 1963

| Age class | Broods | Ducklings | Average brood |
|----------------|--------|-----------|---------------|
| Class I----- | 5 | 27 | 5.4 |
| Class II----- | 42 | 261 | 6.2 |
| Class III----- | 43 | 241 | 5.6 |
| Total----- | 90 | 529 | 5.8 |

TABLE F-27.--Duck broods, ground counts, Nebraska Sandhills, 1963

| Species | Class Ia | | Class Ib | | Class IIa | | Class IIb | | Class III | | Total ¹ | |
|------------------------|----------|-------|----------|-------|-----------|-------|-----------|-------|-----------|-------|--------------------|-------|
| | Broods | Ducks | Broods | Ducks | Broods | Ducks | Broods | Ducks | Broods | Ducks | Broods | Ducks |
| Ducks: | | | | | | | | | | | | |
| Dabblers: | | | | | | | | | | | | |
| Mallard----- | -- | -- | 1 | 4 | -- | -- | 7 | 35 | 12 | 56 | 20 | 95 |
| Gadwall----- | 1 | 9 | 3 | 26 | 5 | 28 | 3 | 16 | 6 | 38 | 18 | 117 |
| American widgeon----- | -- | -- | -- | -- | -- | -- | -- | -- | 2 | 7 | 2 | 7 |
| Green-winged teal----- | -- | -- | -- | -- | -- | -- | -- | -- | 1 | 8 | 1 | 8 |
| Blue-winged teal----- | 1 | 5 | 5 | 20 | 1 | 10 | 4 | 22 | 3 | 10 | 14 | 67 |
| Shoveler----- | -- | -- | -- | -- | -- | -- | -- | -- | 1 | 9 | 1 | 9 |
| Pintail----- | -- | -- | 3 | 33 | 1 | 4 | 6 | 30 | 11 | 66 | 21 | 133 |
| Divers: | | | | | | | | | | | | |
| Canvasback----- | -- | -- | 1 | 5 | -- | -- | -- | -- | -- | -- | 1 | 5 |
| Ruddy duck----- | -- | -- | -- | -- | 1 | 7 | 1 | 3 | -- | -- | 2 | 10 |
| Unidentified----- | 1 | 1 | -- | -- | 2 | 2 | 1 | 5 | 3 | 13 | 7 | 21 |
| Total----- | 3 | 15 | 13 | 88 | 10 | 51 | 22 | 111 | 39 | 207 | 87 | 472 |

¹ Ducklings/brood average 5.43

TABLE F-28.--Number of Canada geese by breeding classification, Moffat County, Colorado, 1963

| Area | Nesting pairs | 2-year old ¹ pairs | Goslings (estimate ²) | Groups | Total |
|--|---------------|-------------------------------|-----------------------------------|--------|-------|
| Yampa: | | | | | |
| Craig to Juniper Springs----- | 11 | 19 | 41 | 107 | 208 |
| Juniper to Cross Mountain----- | 10 | 5 | 44 | 95 | 169 |
| Lily Park----- | 7 | 12 | 29 | 23 | 90 |
| Subtotal----- | 28 | 36 | 114 | 225 | 467 |
| Green (Brown's Park)----- | 2 | 1 | 8 | 1 | 15 |
| Little Snake (25 ml. up-stream from lower bridge)----- | 4 | 8 | 15 | 117 | 156 |
| Totals----- | 34 | 45 | 137 | 343 | 638 |

¹ Novice pairs which are potential nesters next year.

² This category includes both eggs and goslings counted.

TABLE F-29.--Number Canada geese observed, Moffat County, Colorado, 1963

| Area | Number | | | Percent change | |
|-------------------------|--------|------|-----------------|----------------|----------------------|
| | 1963 | 1962 | 1956-62 average | from 1962 | from 1956-62 average |
| Yampa River----- | 467 | 372 | 177 | + 26 | +164 |
| Green River----- | 15 | 57 | 61 | - 74 | - 75 |
| Little Snake River----- | 156 | 73 | 73 ¹ | +114 | +114 |
| Totals----- | 638 | 502 | 311 | + 27 | +105 |

¹ Little Snake River not included in survey until 1962.

TABLE F-30.--Number of Canada goose goslings observed, Moffat County, Colorado, 1963

| Area | Number | | | Percent change | |
|-------------------------|--------|-----------------|-----------------|----------------|----------------------|
| | 1963 | 1962 | 1956-62 average | from 1962 | from 1956-62 average |
| Yampa River----- | 114 | 126 | 63 | - 10 | + 81 |
| Green River----- | 8 | 21 | 25 | - 62 | - 68 |
| Little Snake River----- | 15 | -- ¹ | -- ² | Inf. | Inf. |
| Totals----- | 137 | 147 | 88 | - 7 | + 56 |

¹ No hatched nests were observed on the Little Snake River in 1962, because of high water.

² Little Snake River not included in survey until 1962.

TABLE F-31.--Production survey indexes, by stratum, northern Saskatchewan, northern Manitoba, and western Ontario, July, 1955-63

[Index numbers, in thousands]

| Year | Stratum | | | | | Total |
|----------------------------------|-----------|----------|----|----------------|-------|-------|
| | Ontario C | Manitoba | | Saskatchewan C | | |
| | | C | D | South | North | |
| Number of young: ¹ | | | | | | |
| 1955----- | -- | 59 | 30 | 46 | 80 | 215 |
| 1956----- | -- | 2 | 7 | 11 | 86 | 106 |
| 1959----- | -- | 25 | 20 | 62 | 58 | 165 |
| 1960----- | 60 | 45 | 26 | 26 | 56 | 213 |
| 1961----- | 116 | 47 | 37 | 38 | 65 | 303 |
| 1962----- | 173 | 52 | 24 | 68 | 77 | 394 |
| 1963----- | 129 | 64 | 52 | 144 | 92 | 481 |
| Late-nesting index: ² | | | | | | |
| 1955----- | -- | 29 | 10 | 11 | 13 | 63 |
| 1956----- | -- | 2 | 7 | 5 | 28 | 42 |
| 1959----- | -- | 9 | 4 | 9 | 17 | 39 |
| 1960----- | 22 | 9 | 6 | 8 | 17 | 62 |
| 1961----- | 6 | 8 | 16 | 9 | 12 | 51 |
| 1962----- | 100 | 30 | 58 | 82 | 29 | 299 |
| 1963----- | 124 | 49 | 29 | 65 | 64 | 359 |

¹ Number of broods multiplied by average brood size.

² As indicated by adult pairs and singles.

TABLE F-32.--Duck broods, by class and stratum, northern Saskatchewan, northern Manitoba, and western Ontario 1956-1963

| Year and class | Stratum | | | | | Total broods | Percent of total |
|----------------|-----------|----------|----|----------------|-------|--------------|------------------|
| | Ontario C | Manitoba | | Saskatchewan C | | | |
| | | C | D | South | North | | |
| 1956: | | | | | | | |
| Class I----- | -- | 10 | 16 | 4 | 19 | 49 | 69 |
| Class II----- | -- | 1 | 4 | 10 | 5 | 20 | 28 |
| Class III----- | -- | -- | -- | 2 | -- | 2 | 3 |
| 1959: | | | | | | | |
| Class I----- | -- | 2 | 14 | 3 | -- | 19 | 11 |
| Class II----- | -- | 6 | 23 | 27 | 5 | 61 | 34 |
| Class III----- | -- | 11 | 26 | 57 | 4 | 98 | 55 |
| 1960: | | | | | | | |
| Class I----- | 4 | 3 | 13 | 2 | 1 | 23 | 10 |
| Class II----- | 13 | 12 | 41 | 8 | 11 | 85 | 35 |
| Class III----- | 24 | 36 | 43 | 25 | 5 | 133 | 55 |
| 1961: | | | | | | | |
| Class I----- | 21 | 5 | 35 | 10 | 3 | 74 | 19 |
| Class II----- | 30 | 22 | 73 | 24 | 11 | 160 | 41 |
| Class III----- | 35 | 28 | 51 | 33 | 7 | 154 | 40 |
| 1962: | | | | | | | |
| Class I----- | 10 | 5 | 6 | 8 | 1 | 30 | 17 |
| Class II----- | 28 | 22 | 24 | 28 | 6 | 108 | 62 |
| Class III----- | 8 | 11 | 11 | 4 | 3 | 37 | 21 |
| 1963: | | | | | | | |
| Class I----- | 4 | 2 | 10 | 11 | -- | 27 | 12 |
| Class II----- | 27 | 29 | 58 | 59 | 8 | 181 | 80 |
| Class III----- | 3 | 7 | 1 | 6 | 2 | 19 | 8 |

TABLE F-33.--Waterfowl brood and late-nesting indexes by stratum compared to previous year and long-term average southern Manitoba - 1963

[Index numbers in thousands]

| Species | Stratum | | Total | | Average 1958 to 1962 | Percent change from | |
|------------------------------------|---------|------|-------|------|----------------------------|------------------------|---------|
| | A | B | 1962 | 1963 | | Previous year | Average |
| Broods: | | | | | | | |
| Duckbrood index ¹ ----- | 10.7 | 21.6 | 15.6 | 32.3 | 35.5 | + 107 | - 9 |
| Average brood size----- | 5.0 | 5.7 | 5.3 | 5.4 | 5.8 | + 2 | - 7 |
| Coot brood index----- | 2.4 | 1.1 | 5.1 | 3.5 | 8.6 | - 31 | - 59 |
| Late Nesting Index ² : | | | | | | | |
| Dabblers: | | | | | | | |
| Mallard----- | 5.4 | 7.9 | 6.2 | 13.3 | 15.2 | + 115 | - 13 |
| Gadwall----- | 2.1 | -- | 1.8 | 2.1 | 1.0 | + 17 | + 110 |
| American widgeon----- | 1.1 | 3.2 | -- | 4.3 | 3.7 | + -- | + 16 |
| Green-winged teal----- | .2 | -- | -- | .2 | .3 | + -- | - 33 |
| Blue-winged teal----- | .4 | 2.2 | 2.8 | 2.6 | 10.3 | - 7 | - 75 |
| Shoveler----- | .2 | -- | -- | .2 | .8 | + -- | - 75 |
| Pintail----- | 1.1 | 1.1 | .2 | 2.2 | 2.5 | + 1,100 | - 12 |
| Subtotal----- | 10.5 | 14.4 | 11.0 | 24.9 | 33.8 | + 126 | - 26 |
| Divers: | | | | | | | |
| Redhead----- | .7 | -- | .1 | .7 | 1.3 | + 600 | - 46 |
| Canvasback----- | 1.1 | -- | -- | 1.1 | 1.3 | + -- | - 15 |
| Scaup----- | 1.7 | -- | .7 | 1.7 | 5.1 | + 143 | - 67 |
| Ring-necked duck----- | .2 | -- | .7 | .2 | .8 | - 71 | - 75 |
| Goldeneye----- | .2 | -- | -- | .2 | .3 | + -- | - 33 |
| Bufflehead----- | .2 | -- | -- | .2 | .8 | + -- | - 75 |
| Ruddy duck----- | 5.8 | 2.2 | 2.4 | 8.0 | 3.8 | + 233 | + 111 |
| Subtotal----- | 9.9 | 2.2 | 3.9 | 12.1 | 13.4 | + 210 | - 10 |
| Miscellaneous----- | -- | -- | -- | -- | .4 | -- | -- |
| Total ducks----- | 20.4 | 16.6 | 14.9 | 37.0 | 47.6 | + 148 | - 22 |

¹ Class II and III broods only.

² As indicated by adult pairs and singles.

TABLE F-34.--Long-term trend waterfowl brood and late-nesting indexes by species for southern Manitoba, July 1958-63

[Index numbers in thousands]

| Species | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|
| Broods: | | | | | | |
| Duckbrood index----- | 62.8 | 31.1 | 32.2 | 35.7 | 15.6 | 32.3 |
| Average brood size ¹ ----- | 6.6 | 5.4 | 6.2 | 5.5 | 5.3 | 5.4 |
| Coot brood index----- | 13.2 | 1.3 | 18.9 | 4.4 | 5.1 | 3.5 |
| Late nesting index ²: | | | | | | |
| Dabblers: | | | | | | |
| Mallard----- | 23.8 | 20.0 | 18.1 | 7.7 | 6.2 | 13.3 |
| Gadwall----- | .7 | .5 | 1.0 | .9 | 1.8 | 2.1 |
| American widgeon----- | 8.6 | 3.9 | 3.1 | 2.7 | -- | 4.3 |
| Green-winged teal----- | .5 | -- | 1.1 | .1 | -- | .2 |
| Blue-winged teal----- | 15.8 | 20.6 | 10.5 | 1.6 | 2.8 | 2.6 |
| Shoveler----- | .8 | .4 | 2.5 | .3 | -- | .2 |
| Pintail----- | 4.7 | 2.5 | 3.2 | 1.6 | .2 | 2.2 |
| Subtotal----- | 54.9 | 47.9 | 39.5 | 14.9 | 11.0 | 24.9 |
| Divers: | | | | | | |
| Redhead----- | 3.1 | 1.3 | 1.0 | 1.2 | .1 | .7 |
| Canvasback----- | 4.3 | .9 | .4 | .9 | -- | 1.1 |
| Scaup----- | 11.2 | 7.8 | 2.4 | 3.4 | .7 | 1.7 |
| Ring-necked duck----- | 1.6 | 1.0 | .2 | .6 | .7 | .2 |
| Goldeneye----- | .4 | .8 | -- | .1 | -- | .2 |
| Bufflehead----- | .8 | 1.8 | .9 | .5 | -- | .2 |
| Ruddy duck----- | 5.5 | 6.7 | 3.5 | 1.0 | 2.4 | 8.0 |
| Subtotal----- | 26.9 | 20.3 | 8.4 | 7.7 | 3.9 | 12.1 |
| Miscellaneous----- | .6 | -- | -- | 1.2 | -- | -- |
| Total----- | 82.4 | 68.2 | 47.9 | 23.8 | 14.9 | 37.0 |

¹ Class II and III broods only.

² As indicated by adult pairs and singles.

TABLE F-35.--Waterfowl population summary southern Manitoba, July, 1963

| | Stratum A | Stratum B | Strata A and B |
|---------------------------------------|-----------|-----------|----------------|
| Area in square miles----- | 10,368 | 28,600 | 38,968 |
| Lineal miles in sample----- | 1,578 | 636 | 2,214 |
| Square miles in waterfowl sample----- | 197.25 | 79.5 | 276.75 |
| Broods: | | | |
| Broods seen----- | 203 | 60 | 263 |
| Brood indexes----- | 10,700 | 21,600 | 32,300 |
| Broods per square mile----- | 1.0 | .75 | .8 |
| Late nesters: | | | |
| Late nesters seen----- | 388 | 46 | 434 |
| Late nesting index----- | 20,400 | 16,600 | 37,000 |
| Late nesters per square mile----- | 2.0 | .6 | .9 |
| Coots: | | | |
| Coot broods seen----- | 45 | 3 | 48 |
| Coot brood index----- | 2,400 | 1,100 | 3,500 |
| Coot broods per square mile----- | .2 | .04 | .09 |
| Ponds: | | | |
| Ponds seen----- | 2,760 | 494 | 3,254 |
| Pond index----- | 145,100 | 177,700 | 322,800 |
| Ponds per square mile----- | 14.0 | 6.2 | 8.3 |
| Expansion factor----- | 52.563 | 359.75 | -- |

Note: Transects B 9 and 10 not flown.

TABLE F-36.--Percentage age-class distribution of duck broods, by stratum, southern Manitoba, 1954-63

| Year | Stratum A | | | Stratum B | | | Total | | |
|-----------|-----------|----------|-----------|-----------|----------|-----------|---------|----------|-----------|
| | Class I | Class II | Class III | Class I | Class II | Class III | Class I | Class II | Class III |
| 1954----- | 61.5 | 33.5 | 5.0 | 62.9 | 20.0 | 17.1 | 62.2 | 26.4 | 11.4 |
| 1955----- | 41.9 | 30.2 | 27.9 | 17.4 | 43.5 | 39.1 | 29.9 | 36.7 | 33.4 |
| 1956----- | 31.2 | 41.6 | 27.2 | 17.6 | 50.0 | 32.4 | 29.4 | 42.8 | 27.8 |
| 1957----- | 29.2 | 43.2 | 27.6 | 28.1 | 56.1 | 15.8 | 29.1 | 44.4 | 26.5 |
| 1958----- | 51.7 | 34.5 | 13.8 | 45.2 | 45.2 | 9.7 | 51.2 | 35.4 | 13.5 |
| 1959----- | 60.4 | 32.7 | 6.8 | 63.0 | 34.8 | 2.2 | 60.8 | 33.0 | 6.2 |
| 1960----- | 47.4 | 45.4 | 7.2 | 41.0 | 54.1 | 4.9 | 45.9 | 47.5 | 6.7 |
| 1961----- | 35.6 | 50.0 | 14.4 | 28.8 | 59.1 | 12.1 | 30.9 | 56.3 | 12.8 |
| 1962----- | 40.2 | 50.5 | 9.2 | 42.3 | 42.3 | 15.4 | 40.6 | 48.7 | 10.7 |
| 1963----- | 9.5 | 44.4 | 46.1 | 16.6 | 41.7 | 41.7 | 11.0 | 43.8 | 45.2 |

TABLE F-37.--Number of broods, by species and area, Minnesota, 1960-63

| Species and area | 1960 | 1961 | 1962 | 1963 |
|-------------------------------|------|------|------|------|
| Study area, Ottertail County: | | | | |
| Mallard----- | -- | 5 | 4 | 13 |
| Blue-winged teal----- | -- | 16 | 19 | 13 |
| Other ducks----- | -- | 2 | 1 | 9 |
| Subtotal----- | -- | 23 | 24 | 35 |
| Chippewa National Forest: | | | | |
| Mallard----- | 92 | 90 | 35 | 114 |
| Mud Lake, Washington County: | | | | |
| Mallard----- | 5 | 4 | 4 | 9 |
| Wood duck----- | 5 | 5 | 3 | 7 |
| Blue-winged teal----- | 4 | 4 | 2 | 5 |
| Subtotal----- | 14 | 13 | 9 | 21 |
| Thief Lake Refuge: | | | | |
| Unidentified----- | -- | -- | 26 | 50 |
| Total----- | 106 | 126 | 94 | 220 |

TABLE F-38. --Average brood size and age-class distribution of duck broods, Chippewa National Forest, Minnesota, 1937-63

| Year | Class I | Class II | Class III | Average | Total Broods |
|-----------------------|---------|----------|-----------|---------|--------------|
| 1937----- | -- | 6.3 | 6.5 | 6.5 | 56 |
| 1938----- | 8.8 | 7.8 | 6.5 | 7.3 | 166 |
| 1939----- | 8.8 | 7.6 | 7.4 | 7.8 | 256 |
| 1940----- | 8.7 | 7.4 | 7.0 | 7.8 | 94 |
| 1941----- | - | 7.3 | 6.7 | 6.9 | 17 |
| 1947----- | 7.8 | 7.9 | 7.0 | 7.5 | 67 |
| 1948----- | 7.1 | 7.6 | 6.8 | 7.2 | 102 |
| 1949----- | 4.8 | 6.8 | 6.7 | 6.4 | 31 |
| 1950----- | 8.1 | 7.2 | 6.6 | 7.0 | 49 |
| 1951----- | 6.6 | 6.8 | 6.3 | 6.5 | 92 |
| 1952----- | 4.5 | 7.2 | 6.7 | 6.6 | 127 |
| 1953----- | 7.5 | 5.7 | 5.6 | 5.9 | 18 |
| 1954----- | 7.8 | 7.0 | 5.5 | 6.6 | 44 |
| 1955----- | 7.0 | 7.1 | 7.0 | 7.0 | 51 |
| 1956----- | 6.9 | 6.7 | 6.9 | 6.8 | 63 |
| 1957----- | -- | 6.4 | 7.4 | 7.0 | 24 |
| 1958----- | 6.8 | 7.3 | 7.3 | 7.2 | 63 |
| 1959----- | 4.6 | 6.6 | 7.1 | 6.5 | 55 |
| 1960----- | 7.2 | 6.5 | 6.2 | 6.6 | 92 |
| 1961----- | 5.7 | 6.5 | 6.1 | 6.3 | 90 |
| 1962----- | 7.2 | 7.9 | 4.0 | 6.5 | 23 |
| 1963----- | 5.5 | 6.6 | 6.8 | 6.4 | 72 |
| Percent of Total----- | 19.0 | 47.0 | 34.0 | -- | -- |

TABLE F-39. --Duck production ratios, Chippewa National Forest, Minnesota, 1962-63

| Species | 1962 | | | 1963 | | |
|-----------------------|--------|-----------|-------|--------|-----------|-------|
| | Adults | Juveniles | Ratio | Adults | Juveniles | Ratio |
| Mallard----- | 221 | 233 | 1:1.1 | 373 | 730 | 1:1.9 |
| American widgeon----- | 101 | 40 | 1:0.4 | 53 | 127 | 1:2.3 |
| Blue-winged teal----- | 27 | 18 | 1:0.7 | 39 | 186 | 1:4.7 |
| Wood duck----- | 22 | 70 | 1:3.2 | 65 | 204 | 1:3.1 |
| Ring-necked duck----- | 38 | 3 | 1:0.1 | 8 | 30 | 1:3.7 |
| Goldeneye----- | 60 | 133 | 1:2.2 | 32 | 214 | 1:6.7 |
| Other----- | 26 | 21 | 1:0.8 | 25 | 39 | 1:5.0 |

TABLE F-40. --Duck production indexes, Michigan, 1951-63

| Year | Number per lineal mile | | | Average brood size |
|-----------|------------------------|----------------|-------------|--------------------|
| | Broods | Hens and young | Lone drakes | |
| 1951----- | 0.35 | 2.20 | 3.31 | 5.76 |
| 1952----- | .70 | 3.92 | 3.21 | 4.60 |
| 1953----- | .51 | 3.63 | 4.32 | 6.10 |
| 1954----- | .20 | 1.67 | 4.60 | 6.24 |
| 1955----- | .64 | 4.65 | 5.09 | 6.28 |
| 1956----- | .53 | 3.67 | 4.40 | 5.86 |
| 1957----- | .38 | 2.30 | 4.80 | 5.10 |
| 1958----- | .31 | 2.18 | 6.50 | 5.97 |
| 1959----- | .66 | 4.00 | 12.58 | 5.06 |
| 1960----- | .33 | 2.48 | 14.49 | 6.50 |
| 1961----- | .67 | 3.80 | 7.71 | 5.64 |
| 1962----- | .87 | 5.64 | 8.48 | 5.60 |
| 1963----- | 1.08 | 6.82 | 6.06 | 5.33 |

TABLE F-41.--Wood duck broods observed by stream section and age class, Indiana, 1963

| Stream area | Miles of transect | Date censused 1963 | Number of broods | | | | | | Total | | Percent change from 1962 | 5-year average 1958-62 | 10-year average 1953-63 |
|--|-------------------------|--------------------------|------------------|----|----|-----------------|----|----|-------|------|--------------------------------|------------------------------|-------------------------------|
| | | | Age class I | | | Age class II | | | | | | | |
| | | | A | B | C | A | B | C | 1963 | 1962 | | | |
| Maumee----- | 15 | 6/12 | -- | 1 | 2 | 2 | 3 | 5 | 13 | 9 | +44.0 | 7.8 | 6.7 |
| Elkhart----- | 17 | 6/11 | -- | -- | 2 | 3 | 1 | 1 | 7 | 5 | +40.0 | 3.8 | 3.7 |
| Iroquois----- | 14 | 6/14 | -- | 2 | 1 | 1 | 1 | -- | 5 | 3 | +66.7 | 1.8 | 2.6 |
| Minissinewa----- | 13 | 6/6 | -- | -- | 1 | 1 | 3 | -- | 5 | 5 | -- | 3.0 | 4.4 |
| Big Blue----- | 12 | 6/5 | 1 | 5 | 2 | 2 | 2 | 1 | 13 | 12 | +8.3 | 6.6 | 6.7 |
| White, West Fork-- | 25 | 6/4 | -- | 4 | 2 | 5 | 2 | 3 | 16 | 9 | +77.8 | 10.6 | 13.5 |
| Muscatatuck----- | 19 | 5/28 | -- | 7 | 13 | 12 | 19 | 5 | 56 | 49 | +14.3 | 48.0 | 36.3 |
| Salt Creek----- | 15 | 5/29 | -- | 3 | 3 | 5 | 8 | 7 | 26 | 21 | +23.8 | 15.6 | 10.2 |
| Eel River----- | 13 | 5/30 | -- | 4 | 1 | -- | 2 | 2 | 9 | 16 | -43.8 | 15.8 | 10.1 |
| Total----- | 143 | | 1 | 26 | 27 | 31 | 41 | 24 | 150 | 129 | +16.3 | 113.0 | 94.2 |
| Percent change from 1962----- | | | | | | | | | | | +16.3 | -- | -- |
| Percent change from 5-year average 1958-62----- | | | | | | | | | | | -- | +32.7 | -- |
| Percent change from 10-year average 1953-62----- | | | | | | | | | | | -- | -- | +59.2 |

TABLE F-42.--Duck nesting effort and production data, Missouri, 1959-63

| | 1959 | 1960 | 1961 | 1962 | 1963 | Percent change from 1962 |
|--------------------------------------|-------|-------|--------|-------|--------|--------------------------|
| Lake and marsh censused (acres)----- | 7,884 | 8,733 | 13,403 | 9,662 | 10,938 | + 13.2 |
| Streams censused (miles)----- | 583 | 653 | 510 | 470 | 743 | + 58.0 |
| Wood duck: | | | | | | |
| Nesting effort: | | | | | | |
| Per sq. mile of lake and marsh----- | 5.0 | 4.9 | 2.9 | 3.2 | 12.7 | +296.9 |
| Per mile of stream----- | .22 | .11 | .27 | .32 | .33 | + 3.1 |
| Number of broods (stream)----- | 78 | 19 | 61 | 53 | 122 | +130.1 |
| Broods per mile (stream)----- | .13 | .03 | .12 | .11 | .16 | + 45.4 |
| Number of broods (marsh)----- | 19 | 17 | 21 | 13 | 42 | -- |
| Broods per sq. mi. (marsh)----- | 1.6 | 1.2 | 1.0 | .9 | 2.5 | -- |
| Average number of ducklings in---- | | | | | | |
| Class I----- | 7.0 | 8.0 | 6.4 | 8.8 | 6.6 | -- |
| Class II----- | 5.0 | 7.2 | 6.4 | 7.2 | 7.1 | -- |
| Class III----- | 4.0 | 3.2 | 4.3 | 6.2 | 5.1 | -- |
| All classes----- | 5.6 | 7.1 | 5.8 | 8.1 | 6.5 | -- |
| Mallard and blue-winged teal: | | | | | | |
| Nesting effort: | | | | | | |
| Per sq. mi. of lake and marsh----- | 2.5 | 1.3 | 1.6 | 0.8 | 4.3 | +437.5 |
| Per mile of stream----- | .05 | .02 | .04 | .12 | .03 | - 75.0 |

TABLE F-43.--Waterfowl brood and late-nesting indexes by stratum compared to previous year and long-term averages for eastern Ontario, Quebec, and Labrador, 1963

[Index numbers in thousands]

| Species | Stratum | | | | | Total | | Average 19- to 19- | Percent change from previous year |
|-------------------------------|--------------|-------------|-------------|---------------|--------|---------------|--------------|--------------------|-----------------------------------|
| | Mixed boreal | Main boreal | Open boreal | Forest tundra | Tundra | Previous year | Current year | | |
| Broods: | | | | | | | | | |
| Duck brood index----- | 9 | 33 | 77 | 27 | 4 | 88 | 150 | -- | +70.4 |
| Average brood size--- | 4.00 | 6.00 | 5.64 | 5.07 | 5.00 | 4.96 | 5.24 | -- | +5.6 |
| Late nesting index: | | | | | | | | | |
| Dabblers: | | | | | | | | | |
| Mallard----- | 2 | 2 | Trace | | | Trace | 4 | -- | |
| Black duck----- | 3 | 10 | 12 | 6 | 3 | 38 | 34 | -- | -10.5 |
| Gadwall----- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Green-winged teal--- | 1 | -- | -- | -- | -- | 1 | 1 | -- | -- |
| Blue-winged teal--- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Shoveler----- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pintail----- | Trace | Trace | Trace | Trace | 1 | Trace | 1 | -- | -- |
| Subtotal----- | 6 | 12 | 12 | 6 | 4 | 39 | 40 | -- | +2.6 |
| Divers: | | | | | | | | | |
| Redhead----- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Canvasback----- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Scaup----- | 1 | 4 | 1 | -- | -- | 7 | 6 | -- | -14.3 |
| Ring-necked duck--- | -- | 1 | -- | -- | -- | Trace | 1 | -- | -- |
| Goldeneye----- | Trace | 1 | -- | -- | -- | 2 | 1 | -- | -50.0 |
| Bufflehead----- | Trace | 1 | Trace | -- | -- | 5 | 1 | -- | -80.0 |
| Ruddy duck----- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Subtotal----- | 1 | 7 | 1 | -- | -- | 14 | 9 | -- | +33.3 |
| Miscellaneous: | | | | | | | | | |
| Scoter----- | -- | 1 | 2 | 2 | 1 | Trace | 6 | -- | -- |
| Merganser----- | 12 | 18 | 16 | 3 | Trace | 34 | 49 | -- | +44.1 |
| Subtotal----- | 12 | 19 | 18 | 5 | 1 | 34 | 55 | -- | -- |
| Total ducks----- | 19 | 38 | 31 | 11 | 5 | 87 | 104 | -- | +19.5 |
| Goose brood index----- | -- | 5 | 21 | 9 | 22 | 39 | 57 | -- | +46.2 |
| Average goose brood size----- | -- | 5.50 | 2.94 | 3.57 | 3.93 | 2.96 | 3.39 | -- | +14.5 |
| Late nesting index----- | 1 | 4 | 2 | 7 | 0 | 3 | 18 | -- | +500.0 |

TABLE F-44.--Long-term trend in July waterfowl brood and late-nesting indexes by species for eastern Ontario, Quebec, and Labrador, 1963

[index numbers in thousands]

| Species | 1962 | 1963 |
|-------------------------------|-------|------|
| Broods: | | |
| Duck brood index----- | 88 | 150 |
| Average duck brood size----- | 4.96 | 5.24 |
| Late nesting index: | | |
| Dabblers: | | |
| Mallard----- | Trace | 4 |
| Black duck----- | 38 | 34 |
| Gadwall----- | -- | -- |
| Green-winged teal----- | 1 | 1 |
| Blue-winged teal----- | -- | -- |
| Shoveler----- | -- | -- |
| Pintail----- | Trace | 1 |
| Subtotal----- | 39 | 40 |
| Divers: | | |
| Redhead----- | -- | -- |
| Canvasback----- | -- | -- |
| Scaup----- | 7 | 6 |
| Ring-necked duck----- | Trace | 1 |
| Goldeneye----- | 2 | 1 |
| Bufflehead----- | 5 | 1 |
| Ruddy duck----- | -- | -- |
| Subtotal----- | 14 | 9 |
| Miscellaneous: | | |
| Scoter----- | Trace | 6 |
| Merganser----- | 34 | 49 |
| Subtotal----- | 34 | 55 |
| Total ducks----- | 87 | 104 |
| Goose brood index----- | 39 | 57 |
| Average goose brood size----- | 2.96 | 3.39 |

TABLE F-45.--Duck broods, by size and age class, Maine, July, 1963

| Species | Total broods | Class I | | Class II | | Class III | |
|-------------------------|--------------|---------|--------------|----------|--------------|-----------|--------------|
| | | Broods | Average size | Broods | Average size | Broods | Average size |
| Black duck----- | 39 | 14 | 6.9 | 23 | 5.7 | 2 | 6.0 |
| Green-winged teal----- | 1 | 1 | 8.9 | -- | -- | -- | -- |
| Blue-winged teal----- | 3 | 2 | 12.5 | 1 | 7.0 | -- | -- |
| Wood duck----- | 13 | 8 | 8.4 | 5 | 8.4 | -- | -- |
| Ring-necked duck----- | 16 | 12 | 8.4 | 4 | 8.3 | -- | -- |
| Goldeneye (common)----- | 5 | -- | -- | 4 | 5.0 | 1 | 3.0 |
| Total----- | 77 | 37 | 8.0 | 37 | 6.3 | 3 | 5.0 |

G. RECOVERY RATES FROM PRESEASON BANDING TABLES

TABLE G-1.--Summary of some mallard first hunting season recovery rates¹ from pre hunting season bandings, 1959-62

| State - Location | Age when banded | | | | | | | |
|---------------------------------|-----------------|------|------|------|-------|------|------|------|
| | Immature | | | | Adult | | | |
| | 1959 | 1960 | 1961 | 1962 | 1959 | 1960 | 1961 | 1962 |
| Pacific Flyway: | | | | | | | | |
| Washington: | | | | | | | | |
| McNary ² ----- | -- | -- | -- | -- | -- | -- | 3.0 | 8.9 |
| Oregon: | | | | | | | | |
| Sauvie Island----- | 23.8 | 25.6 | 18.7 | 23.7 | 19.8 | 17.9 | 10.0 | 10.8 |
| Malheur ² ----- | -- | 6.3 | 5.1 | 2.5 | -- | 5.6 | 5.7 | 3.2 |
| California: | | | | | | | | |
| Tule Lake ² ----- | 15.9 | 13.9 | 14.7 | 13.6 | 6.7 | 7.7 | 6.6 | 5.1 |
| Los Banos, Merced----- | -- | -- | 19.3 | 14.3 | -- | -- | -- | 13.0 |
| Idaho: | | | | | | | | |
| Camas ² ----- | -- | -- | -- | -- | -- | 4.5 | 4.2 | 2.5 |
| Montana: | | | | | | | | |
| Ninepipe ² ----- | 13.9 | 10.5 | 11.3 | 6.7 | 3.7 | 5.8 | 8.8 | 8.2 |
| Nevada: | | | | | | | | |
| Ruby Lake ² ----- | -- | -- | 9.0 | 7.0 | -- | 7.7 | 7.4 | 3.8 |
| Central Flyway: | | | | | | | | |
| Montana: | | | | | | | | |
| Medicine ² ----- | -- | 5.4 | -- | 3.0 | 6.5 | 4.8 | 3.1 | 0.8 |
| North Dakota: | | | | | | | | |
| Upper Souris ² ----- | -- | -- | 6.4 | 0.8 | -- | -- | 4.3 | 2.9 |
| Lower Souris ² ----- | -- | 8.0 | 8.7 | 2.2 | 4.7 | 7.1 | 5.1 | 1.8 |
| South Dakota: | | | | | | | | |
| Sand Lake ² ----- | -- | 7.1 | 3.6 | 4.8 | -- | 8.3 | 3.8 | 1.8 |
| Mississippi Flyway: | | | | | | | | |
| Michigan: | | | | | | | | |
| Shiawassee ² ----- | 12.1 | 15.3 | 8.3 | 6.3 | -- | -- | 8.2 | 4.1 |
| Seney ² ----- | 14.2 | 14.5 | 7.8 | 11.6 | -- | -- | -- | -- |
| Minnesota: | | | | | | | | |
| Agassiz ² ----- | 11.5 | 18.5 | 7.3 | 7.2 | 8.6 | 8.3 | 4.2 | 2.7 |
| Rice Lake ² ----- | 14.5 | 13.6 | 5.0 | 8.3 | 13.0 | 10.7 | -- | 5.7 |
| Wisconsin: | | | | | | | | |
| Horicon ² ----- | -- | -- | 10.0 | 11.2 | -- | -- | 4.1 | 5.9 |
| Atlantic Flyway: | | | | | | | | |
| New York: | | | | | | | | |
| Perch Lake----- | 11.1 | 13.8 | 12.7 | 7.8 | -- | -- | 11.3 | 5.8 |
| Howland Island----- | -- | 8.3 | 11.5 | 6.3 | -- | 5.8 | 5.8 | 4.4 |
| Montezuma ² ----- | -- | -- | 13.2 | 8.7 | -- | -- | -- | -- |
| Canada: | | | | | | | | |
| Alberta: | | | | | | | | |
| All locations combined----- | -- | -- | 8.0 | 7.5 | -- | -- | 5.9 | 7.7 |
| Saskatchewan: | | | | | | | | |
| All locations combined----- | -- | -- | 6.1 | 6.1 | -- | -- | 4.4 | 5.0 |
| Manitoba: | | | | | | | | |
| All locations combined----- | -- | -- | 7.8 | 8.6 | -- | -- | 6.4 | 5.9 |
| Ontario: | | | | | | | | |
| Oshawa----- | 15.8 | 13.6 | 10.7 | 11.6 | -- | -- | -- | -- |
| Guelph----- | -- | -- | 14.6 | 17.3 | -- | -- | -- | -- |

¹ All rates are based upon samples of 100 or more banded birds.

² National Wildlife Refuge.

TABLE G-2. --Summary of some black duck first hunting season recovery rates¹
from pre hunting season bandings, 1959-62

| State - Location | Age when banded | | | | | | | |
|---|-----------------|------|------|------|-------|------|------|------|
| | Immature | | | | Adult | | | |
| | 1959 | 1960 | 1961 | 1962 | 1959 | 1960 | 1961 | 1962 |
| Minnesota: / Rice Lake ² ----- | 16.9 | 21.7 | -- | 8.0 | 14.5 | -- | -- | 4.2 |
| Wisconsin: Horicon ² ----- | -- | -- | 12.1 | 9.4 | -- | -- | 3.8 | 10.2 |
| Michigan: Shiawassee ² ----- | -- | 16.3 | 6.6 | 8.9 | -- | -- | -- | -- |
| Seney ² ----- | 10.3 | 14.5 | 7.8 | 5.0 | -- | -- | -- | -- |
| Ontario: Oshawa----- | 14.2 | 12.5 | 13.6 | 13.0 | -- | -- | -- | -- |
| Guelph----- | -- | -- | 15.3 | 20.8 | -- | -- | -- | -- |
| New York: Perch Lake----- | 9.9 | 13.6 | 14.0 | 8.3 | 6.6 | 11.5 | -- | 7.8 |
| Oak Orchard----- | -- | -- | 7.3 | 10.9 | -- | -- | -- | -- |
| Wilson Hill----- | 11.8 | 18.1 | 9.0 | 12.7 | 8.1 | 15.3 | 7.5 | 8.4 |
| Massachusetts: Parker River ² ----- | -- | -- | 8.4 | 9.9 | -- | -- | -- | -- |
| Maine: Moosehorn ² ----- | -- | -- | 5.5 | 6.9 | -- | -- | -- | -- |

¹All rates are based upon five or more recoveries.

²National Wildlife Refuge.

TABLE G-3. --Summary of some wood duck first hunting season recovery rates from summer and preseason bandings

| State | Year banded | Number banded | | Direct recovery rate | |
|----------------|-------------|---------------|----------|----------------------|----------|
| | | Adult | Immature | Adult | Immature |
| Maine----- | 1961 | 172 | 118 | 5.2 | 7.6 |
| | 1962 | 369 | 272 | 4.6 | 8.3 |
| Vermont----- | 1958 | 73 | 274 | 15.1 | 13.5 |
| | 1959 | 111 | 183 | 8.1 | 12.2 |
| | 1960 | 225 | 573 | 7.6 | 9.2 |
| | 1961 | 320 | 324 | 7.5 | 7.7 |
| | 1962 | 161 | 239 | 6.2 | 8.8 |
| New York----- | 1958 | 53 | 456 | 7.5 | 9.0 |
| | 1959 | 130 | 199 | 1.5 | 5.5 |
| | 1960 | 160 | 496 | 4.4 | 7.9 |
| | 1961 | 210 | 557 | 2.9 | 7.2 |
| | 1962 | 1,370 | 806 | 4.2 | 5.7 |
| Minnesota----- | 1959 | 185 | 375 | 7.0 | 8.3 |
| | 1960 | 87 | 108 | 9.2 | 9.2 |
| | 1961 | 225 | 483 | 1.8 | 3.1 |
| | 1962 | 398 | 365 | 3.5 | 7.3 |
| Wisconsin----- | 1959 | 258 | 638 | 6.2 | 8.2 |
| | 1960 | 554 | 1,534 | 6.3 | 9.8 |
| | 1961 | 903 | 1,042 | 3.0 | 4.4 |
| | 1962 | 1,370 | 806 | 4.2 | 5.7 |
| Illinois----- | 1959 | 71 | 266 | 8.4 | 3.0 |
| | 1960 | 132 | 904 | 3.8 | 6.6 |
| | 1961 | 92 | 161 | 1.1 | 2.5 |
| | 1962 | 190 | 1,475 | 2.6 | 4.1 |
| Indiana----- | 1959 | 128 | 97 | 3.1 | 2.1 |
| | 1960 | 436 | 294 | 5.0 | 7.8 |
| | 1961 | 306 | 441 | 0.6 | 4.1 |
| | 1962 | 240 | 428 | 3.3 | 4.9 |

H. FALL FLIGHT FORECAST CHARTS

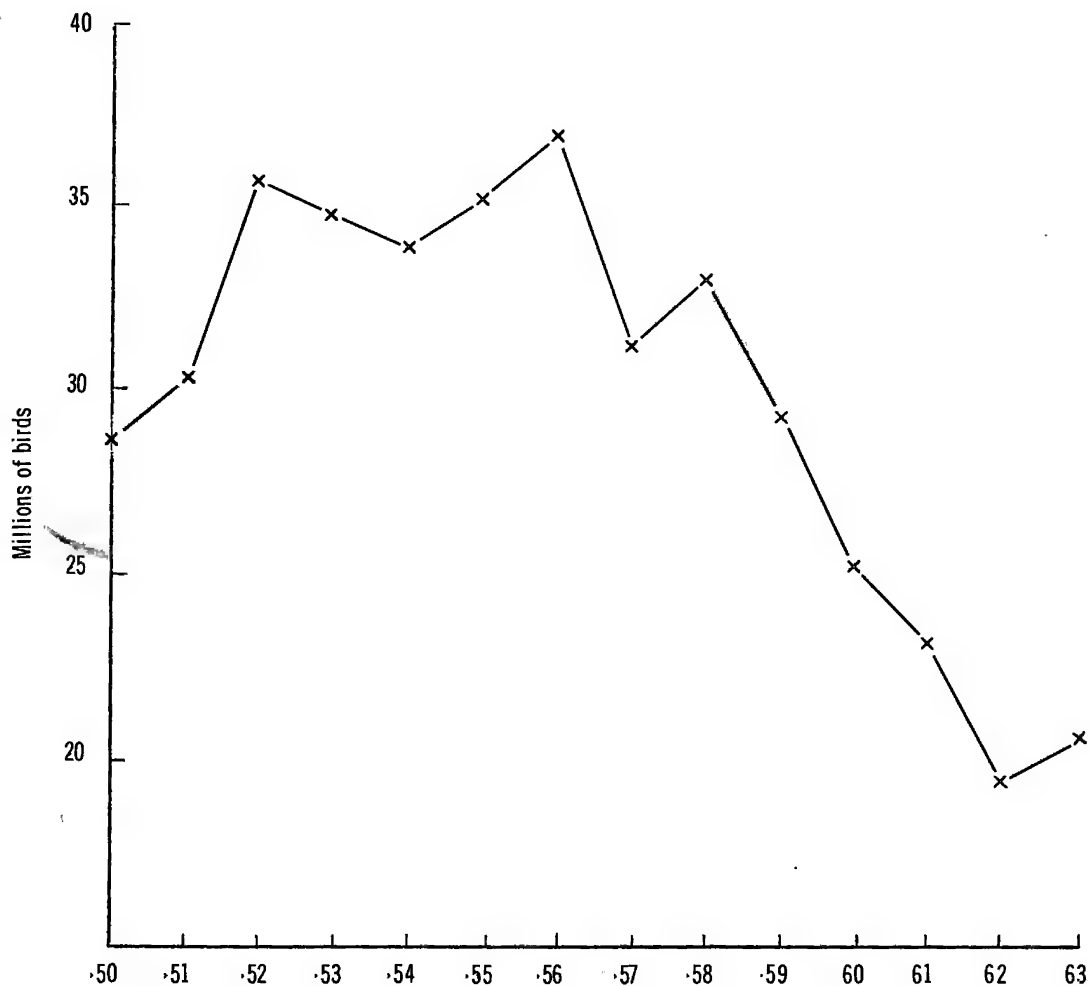


FIGURE H-1.--Trend in North American duck breeding populations (excluding scoter, eider, merganser and oldsquaw)

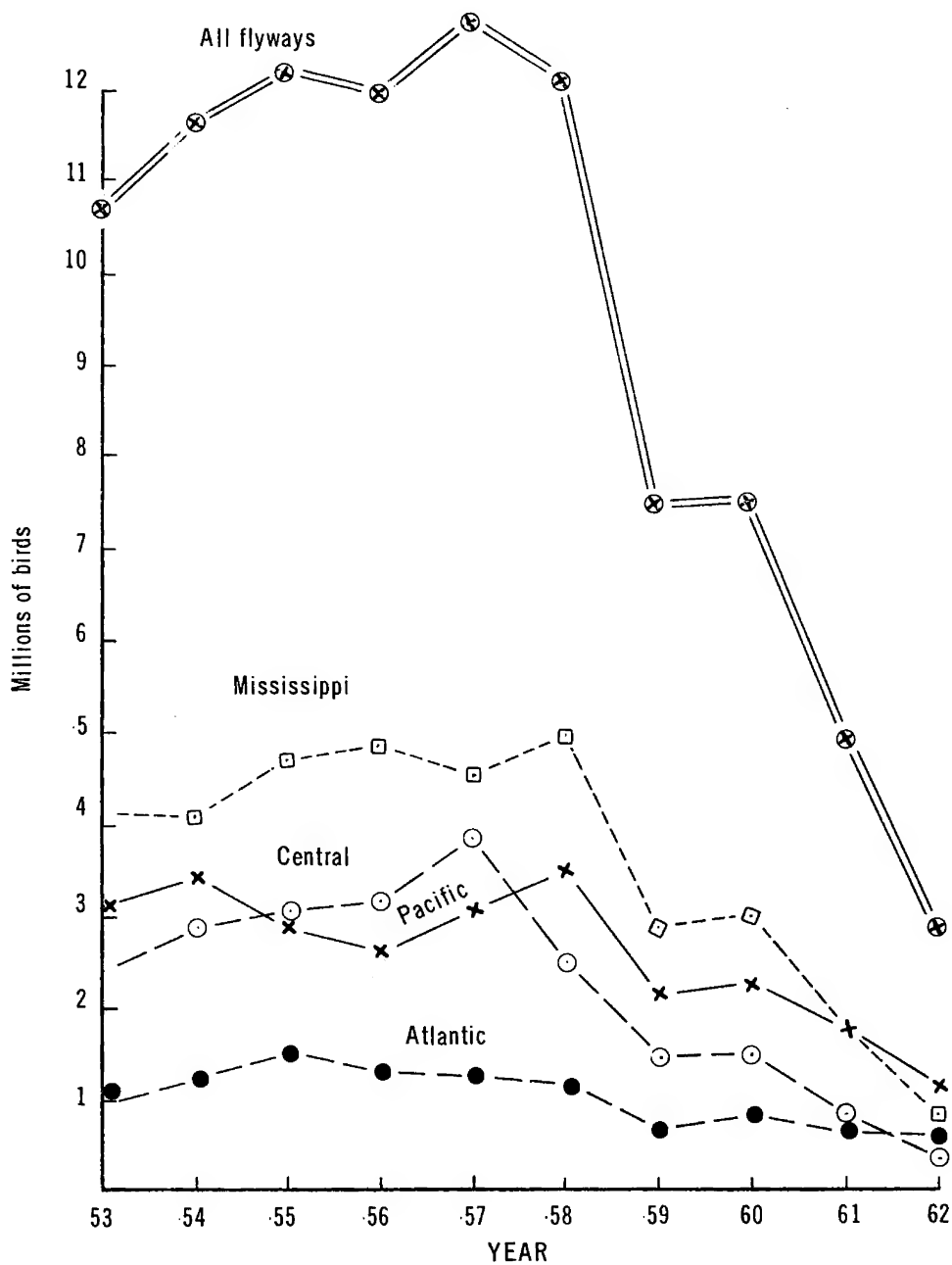


FIGURE H-2.--Estimated number of ducks bagged, 1953-1962

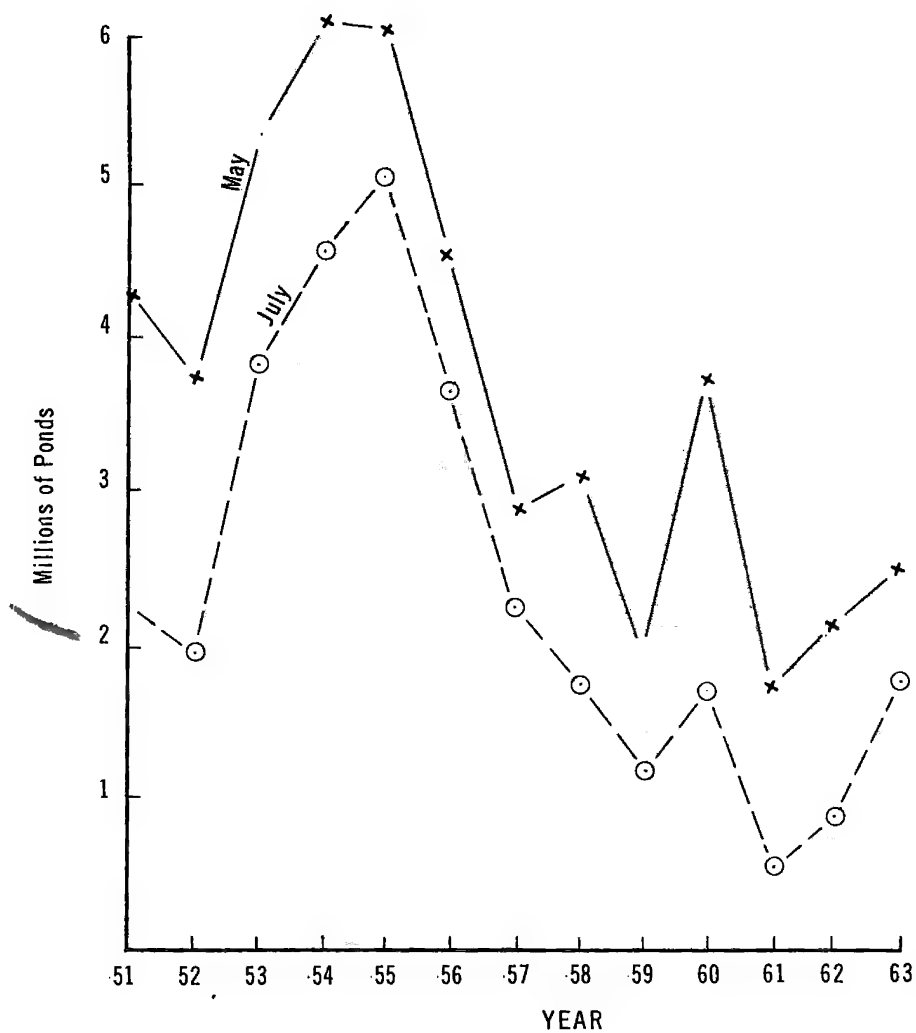


FIGURE H-3.--Number of water areas - Southern Prairie Provinces

I. WATERFOWL HUNTER OPINION SURVEY TABLES

TABLE I-1. --State and flyway-wide percentages of 1960 waterfowl hunters who preferred the restrictive 1962 duck hunting regulations rather than a closed season

| Pacific Flyway | | Central Flyway | | Mississippi Flyway | | Atlantic Flyway | |
|-----------------|---------|-------------------|---------|--------------------|---------|---------------------|---------|
| State | Percent | State | Percent | State | Percent | State | Percent |
| Arizona----- | 64 | Colorado----- | 40 | Alabama----- | 50 | Connecticut----- | 60 |
| California----- | 69 | Kansas----- | 35 | Arkansas----- | 17 | Delaware----- | 51 |
| Idaho----- | 82 | Montana----- | 40 | Illinois----- | 33 | Florida----- | 43 |
| Nevada----- | 80 | Nebraska----- | 35 | Indiana----- | 54 | Georgia----- | 53 |
| Oregon----- | 56 | New Mexico----- | 45 | Iowa----- | 31 | Maine----- | 77 |
| Utah----- | 74 | North Dakota----- | 33 | Kentucky----- | 23 | Maryland----- | 48 |
| Washington----- | 84 | Oklahoma----- | 44 | Louisiana----- | 39 | Massachusetts----- | 77 |
| | | South Dakota----- | 28 | Michigan----- | 51 | New Hampshire----- | 54 |
| | | Texas----- | 35 | Minnesota----- | 29 | New Jersey----- | 53 |
| | | Wyoming----- | 32 | Mississippi----- | 40 | New York----- | 72 |
| | | | | Missouri----- | 29 | North Carolina----- | 70 |
| | | | | Ohio----- | 53 | Pennsylvania----- | 70 |
| | | | | Tennessee----- | 29 | Rhode Island----- | 51 |
| | | | | Wisconsin----- | 45 | South Carolina----- | 77 |
| | | | | | | Vermont----- | 62 |
| | | | | | | Virginia----- | 53 |
| | | | | | | West Virginia----- | 100 |
| Average----- | 73 | | 35 | | 38 | | 64 |

TABLE I-2. --Percentages of 1960 waterfowl hunters selecting each of the listed type of duck hunting restriction as the one preferred when restrictive regulations are necessary

| | A significant reduction in bag limit but none in season length | A significant reduction in season length but none in bag limit | A moderate reduction in both bag limit and season length | No preference |
|---------------------|--|--|--|---------------|
| Pacific | | | | |
| Flyway: | | | | |
| Arizona----- | 12 | 48 | 40 | -- |
| California----- | 17 | 37 | 41 | 5 |
| Idaho----- | 27 | 23 | 45 | 5 |
| Nevada----- | 30 | 40 | 25 | 5 |
| Oregon----- | 16 | 27 | 53 | 4 |
| Utah----- | 19 | 32 | 47 | 2 |
| Washington----- | 22 | 23 | 52 | 3 |
| Flyway----- | 20 | 31 | 46 | 3 |
| Central | | | | |
| Flyway: | | | | |
| Colorado----- | 23 | 35 | 26 | 16 |
| Kansas----- | 11 | 27 | 57 | 5 |
| Montana----- | 10 | 49 | 42 | -- |
| Nebraska----- | 17 | 32 | 45 | 6 |
| New Mexico----- | 17 | 30 | 48 | 5 |
| North Dakota----- | 8 | 56 | 27 | 9 |
| Oklahoma----- | 5 | 31 | 57 | 7 |
| South Dakota----- | 2 | 57 | 40 | 1 |
| Texas----- | 11 | 36 | 43 | 10 |
| Wyoming----- | -- | 18 | 70 | 12 |
| Flyway----- | 10 | 41 | 42 | 7 |
| Mississippi | | | | |
| Flyway: | | | | |
| Alabama----- | 22 | 23 | 50 | 5 |
| Arkansas----- | 6 | 54 | 33 | 7 |
| Illinois----- | 19 | 34 | 38 | 9 |
| Indiana----- | 12 | 26 | 53 | 9 |
| Iowa----- | 21 | 27 | 45 | 7 |
| Kentucky----- | 7 | 46 | 39 | 8 |
| Louisiana----- | 19 | 40 | 24 | 17 |
| Michigan----- | 18 | 20 | 55 | 7 |
| Minnesota----- | 14 | 42 | 36 | 8 |
| Mississippi----- | 5 | 60 | 30 | 5 |
| Missouri----- | 15 | 40 | 35 | 10 |
| Ohio----- | 23 | 27 | 44 | 6 |
| Tennessee----- | 11 | 37 | 44 | 8 |
| Wisconsin----- | 27 | 17 | 46 | 10 |
| Flyway----- | 18 | 32 | 41 | 9 |
| Atlantic | | | | |
| Flyway: | | | | |
| Connecticut----- | 13 | 74 | 13 | -- |
| Delaware----- | 18 | 40 | 42 | -- |
| Florida----- | -- | 46 | 49 | 5 |
| Georgia----- | -- | 28 | 72 | -- |
| Maine----- | 16 | 29 | 45 | 10 |
| Maryland----- | 13 | 40 | 34 | 13 |
| Massachusetts----- | 13 | 29 | 50 | 8 |
| New Hampshire----- | -- | 44 | 28 | 28 |
| New Jersey----- | 36 | 7 | 57 | -- |
| New York----- | 17 | 31 | 49 | 3 |
| North Carolina----- | 18 | 37 | 38 | 7 |
| Pennsylvania----- | 6 | 24 | 66 | 4 |
| Rhode Island----- | 51 | 16 | 16 | 17 |
| South Carolina----- | 14 | 42 | 44 | -- |
| Vermont----- | -- | 62 | -- | 38 |
| Virginia----- | 17 | 31 | 47 | 5 |
| West Virginia----- | 52 | 0 | -- | 48 |
| Flyway----- | 14 | 33 | 47 | 6 |

TABLE I-3.--State and flyway-wide percentages of 1960 waterfowl hunters who purchased "duck stamps" in 1961, and 1962

| Pacific Flyway | | | Central Flyway | | | Mississippi Flyway | | | Atlantic Flyway | | |
|----------------|---------|------|----------------|---------|------|--------------------|---------|------|-----------------|---------|------|
| State | Percent | | State | Percent | | State | Percent | | State | Percent | |
| | 1961 | 1962 | | 1961 | 1962 | | 1961 | 1962 | | 1961 | 1962 |
| Arizona---- | 74 | 36 | Colorado----- | 93 | 41 | Alabama----- | 79 | 38 | Connecticut---- | 100 | 73 |
| California- | 95 | 67 | Kansas----- | 94 | 43 | Arkansas----- | 92 | 24 | Delaware----- | 100 | 83 |
| Idaho----- | 92 | 57 | Montana----- | 87 | 55 | Illinois----- | 87 | 52 | Florida----- | 92 | 49 |
| Nevada----- | 90 | 80 | Nebraska----- | 92 | 51 | Indiana----- | 91 | 55 | Georgia----- | 81 | 47 |
| Oregon----- | 95 | 66 | New Mexico--- | 79 | 35 | Iowa----- | 93 | 63 | Maine----- | 87 | 40 |
| Utah----- | 85 | 59 | North Dakota- | 87 | 62 | Kentucky----- | 84 | 37 | Maryland----- | 91 | 73 |
| Washington- | 91 | 78 | Oklahoma----- | 88 | 47 | Louisiana--- | 86 | 55 | Massachusetts-- | 89 | 66 |
| | | | South Dakota- | 88 | 54 | Michigan----- | 88 | 51 | New Hampshire-- | 85 | 72 |
| | | | Texas----- | 88 | 48 | Minnesota--- | 87 | 55 | New Jersey----- | 93 | 50 |
| | | | Wyoming----- | 80 | 36 | Mississippi--- | 95 | 54 | New York----- | 93 | 68 |
| | | | | | | Missouri----- | 89 | 53 | North Carolina- | 82 | 68 |
| | | | | | | Ohio----- | 85 | 49 | Pennsylvania--- | 92 | 73 |
| | | | | | | Tennessee--- | 80 | 43 | Rhode Island--- | 83 | 83 |
| | | | | | | Wisconsin--- | 83 | 63 | South Carolina- | 91 | 55 |
| | | | | | | | | | Vermont----- | 38 | -- |
| | | | | | | | | | Virginia----- | 90 | 69 |
| | | | | | | | | | West Virginia-- | 100 | 100 |
| Flyway--- | 92 | 68 | | 89 | 50 | | 87 | 54 | | 90 | 64 |

TABLE I-4.--Percentages of those waterfowl hunters, active in 1960 but not in 1962, who chose each of the listed reasons as the one most important for not buying a 1962 "duck stamp"

| | Bag limit too small | Season too short | Pre-season forecasts of few ducks | Too few ducks in hunting area during season | Discouraged by poor hunting in 1960 or 1961 | Risk of accidental violation by shooting protected ducks | Other reasons |
|---------------------|---------------------|------------------|-----------------------------------|---|---|--|---------------|
| Pacific | | | | | | | |
| Flyway: | | | | | | | |
| Arizona----- | -- | -- | -- | 58 | 27 | -- | 15 |
| California----- | 11 | -- | 12 | 33 | 18 | 1 | 25 |
| Idaho----- | -- | -- | -- | 53 | 7 | -- | 40 |
| Nevada----- | -- | -- | -- | 25 | 12 | -- | 63 |
| Oregon----- | -- | 2 | 11 | 27 | 27 | 11 | 22 |
| Utah----- | -- | 7 | -- | 7 | 14 | 14 | 58 |
| Washington----- | 4 | -- | 2 | 9 | 22 | -- | 63 |
| Flyway----- | 5 | 1 | 7 | 26 | 19 | 3 | 39 |
| Central | | | | | | | |
| Flyway: | | | | | | | |
| Colorado----- | 47 | 3 | 3 | 16 | 6 | 3 | 22 |
| Kansas----- | 22 | 6 | 19 | 20 | 2 | 22 | 9 |
| Montana----- | 31 | -- | -- | 15 | 10 | 5 | 39 |
| Nebraska----- | 39 | 9 | 9 | 17 | 11 | 4 | 11 |
| New Mexico----- | 7 | -- | 14 | 29 | 7 | 15 | 28 |
| North Dakota----- | 61 | 3 | 5 | 5 | 8 | 8 | 10 |
| Oklahoma----- | 23 | 3 | 3 | 15 | 18 | 17 | 21 |
| South Dakota----- | 52 | -- | -- | 3 | 7 | 34 | 4 |
| Texas----- | 39 | 3 | 8 | 17 | 10 | 11 | 12 |
| Wyoming----- | 60 | 3 | 7 | -- | -- | 7 | 23 |
| Flyway----- | 41 | 3 | 6 | 13 | 9 | 14 | 14 |
| Mississippi | | | | | | | |
| Flyway: | | | | | | | |
| Alabama----- | -- | 33 | -- | 25 | 17 | 17 | 8 |
| Arkansas----- | 66 | 4 | 9 | 8 | 4 | 5 | 4 |
| Illinois----- | 22 | 15 | 4 | 18 | 22 | 4 | 15 |
| Indiana----- | 26 | 3 | 8 | 36 | 13 | 3 | 11 |
| Iowa----- | 36 | 2 | 8 | 38 | 2 | 2 | 12 |
| Kentucky----- | 10 | -- | 21 | 19 | 19 | 21 | 10 |
| Louisiana----- | 68 | 8 | -- | 15 | 4 | 5 | -- |
| Michigan----- | 34 | 3 | 8 | 18 | 13 | 11 | 13 |
| Minnesota----- | 48 | -- | 9 | 9 | 16 | 7 | 11 |
| Mississippi----- | 89 | -- | -- | 11 | -- | -- | -- |
| Missouri----- | 39 | -- | 5 | 20 | 7 | 13 | 16 |
| Ohio----- | 30 | 11 | 3 | 27 | 19 | 6 | 4 |
| Tennessee----- | 47 | 12 | 8 | 5 | 6 | 3 | 19 |
| Wisconsin----- | 14 | 8 | 7 | 24 | 17 | 17 | 13 |
| Flyway----- | 36 | 6 | 6 | 19 | 13 | 9 | 11 |
| Atlantic | | | | | | | |
| Flyway: | | | | | | | |
| Connecticut----- | 55 | -- | -- | -- | -- | -- | 45 |
| Delaware----- | 17 | -- | -- | -- | 17 | 17 | 49 |
| Florida----- | 18 | -- | 11 | 26 | 15 | 23 | 7 |
| Georgia----- | 42 | -- | -- | 29 | -- | -- | 29 |
| Maine----- | 19 | 3 | 3 | 9 | 22 | 6 | 38 |
| Maryland----- | 18 | -- | -- | 14 | 32 | -- | 36 |
| Massachusetts----- | 19 | 10 | 10 | 17 | 8 | 8 | 28 |
| New Hampshire----- | -- | -- | -- | 61 | -- | 39 | -- |
| New Jersey----- | 14 | -- | -- | 29 | 14 | 15 | 28 |
| New York----- | 6 | 3 | -- | 14 | 20 | 20 | 37 |
| North Carolina----- | 4 | 5 | 4 | 40 | 24 | 7 | 16 |
| Pennsylvania----- | 8 | 24 | -- | 23 | 8 | -- | 37 |
| Rhode Island----- | -- | -- | -- | -- | -- | -- | 100 |
| South Carolina----- | 11 | -- | 11 | 32 | -- | -- | 46 |
| Vermont----- | 62 | -- | -- | -- | -- | 38 | -- |
| Virginia----- | 25 | -- | 8 | 20 | 6 | 16 | 25 |
| West Virginia----- | -- | -- | -- | -- | -- | -- | 100 |
| Flyway----- | 15 | 5 | 3 | 21 | 14 | 14 | 28 |

TABLE I-5.--Percentages of those waterfowl hunters, active in 1960 but not in 1962, who chose each of the listed reasons as the one second in importance for not buying a 1962 "duck stamp"

| | Bag limit too small | Season too short | Pre-season forecasts of few ducks | Too few ducks in hunting area during season | Discouraged by poor hunting in 1960 or 1961 | Risk of accidental violation by shooting protected ducks | Other reasons |
|---------------------|------------------------|---------------------|--|--|--|---|------------------|
| Pacific | | | | | | | |
| Flyway: | | | | | | | |
| Arizona----- | -- | -- | -- | 41 | 20 | 20 | 19 |
| California----- | 2 | 2 | 10 | 24 | 45 | 3 | 14 |
| Idaho----- | -- | 9 | 45 | -- | 9 | 9 | 28 |
| Nevada----- | -- | -- | 12 | -- | -- | 37 | 51 |
| Oregon----- | 3 | -- | 7 | 37 | 24 | 14 | 15 |
| Utah----- | 15 | -- | 14 | -- | 43 | 15 | 13 |
| Washington----- | 16 | 4 | -- | 28 | 32 | 4 | 16 |
| Flyway----- | 6 | 3 | 10 | 22 | 34 | 8 | 17 |
| Central | | | | | | | |
| Flyway: | | | | | | | |
| Colorado----- | 23 | 7 | 8 | 15 | 20 | 23 | 4 |
| Kansas----- | 12 | 6 | 8 | 31 | 13 | 23 | 7 |
| Montana----- | 6 | 8 | 8 | 36 | -- | 6 | 36 |
| Nebraska----- | 16 | 8 | 21 | 18 | 8 | 15 | 14 |
| New Mexico----- | -- | -- | 14 | 58 | 28 | -- | -- |
| North Dakota----- | 14 | 4 | 7 | 7 | 11 | 47 | 10 |
| Oklahoma----- | 10 | 10 | 17 | 21 | 10 | 28 | 4 |
| South Dakota----- | 43 | -- | 11 | 8 | 11 | 19 | 8 |
| Texas----- | 21 | 11 | 8 | 25 | 14 | 18 | 3 |
| Wyoming----- | 10 | 7 | 3 | 33 | 3 | 40 | 4 |
| Flyway----- | 20 | 7 | 10 | 20 | 12 | 23 | 8 |
| Mississippi | | | | | | | |
| Flyway: | | | | | | | |
| Alabama----- | 9 | -- | 9 | 9 | 41 | 9 | 23 |
| Arkansas----- | 15 | 22 | 10 | 20 | 11 | 17 | 5 |
| Illinois----- | 18 | 3 | 9 | 25 | 25 | 14 | 6 |
| Indiana----- | -- | 16 | 3 | 24 | 32 | 3 | 22 |
| Iowa----- | 4 | 7 | 29 | 26 | 8 | 20 | 6 |
| Kentucky----- | 21 | -- | 11 | 11 | 11 | 11 | 35 |
| Louisiana----- | 16 | 33 | 7 | 14 | 7 | 22 | 1 |
| Michigan----- | 12 | 16 | 2 | 20 | 16 | 28 | 6 |
| Minnesota----- | 20 | 2 | 10 | 25 | 19 | 22 | 2 |
| Mississippi----- | -- | 24 | 13 | 18 | 13 | 13 | 19 |
| Missouri----- | 6 | 16 | 13 | 32 | 10 | 19 | 4 |
| Ohio----- | 11 | 24 | 5 | 19 | 11 | 16 | 14 |
| Tennessee----- | 14 | 17 | 9 | 22 | 13 | 22 | 3 |
| Wisconsin----- | 17 | 12 | 15 | 12 | 12 | 20 | 12 |
| Flyway----- | 14 | 12 | 11 | 21 | 15 | 20 | 7 |
| Atlantic | | | | | | | |
| Flyway: | | | | | | | |
| Connecticut----- | -- | -- | -- | -- | -- | -- | 100 |
| Delaware----- | -- | -- | 17 | 17 | -- | 17 | 49 |
| Florida----- | 8 | -- | -- | 49 | 17 | 17 | 9 |
| Georgia----- | -- | 42 | -- | 29 | 29 | -- | -- |
| Maine----- | 10 | 36 | -- | 20 | 15 | 15 | 4 |
| Maryland----- | 14 | -- | 14 | -- | -- | 72 | -- |
| Massachusetts----- | 13 | -- | 10 | 21 | 23 | 10 | 23 |
| New Hampshire----- | -- | -- | -- | -- | -- | -- | 100 |
| New Jersey----- | -- | 56 | 15 | 15 | -- | -- | 14 |
| New York----- | 4 | -- | 33 | 26 | 32 | -- | 5 |
| North Carolina----- | -- | -- | 15 | 12 | 31 | 29 | 13 |
| Pennsylvania----- | -- | -- | 9 | 65 | 18 | -- | 8 |
| Rhode Island----- | -- | -- | -- | -- | -- | -- | 100 |
| South Carolina----- | -- | -- | 21 | 11 | 11 | 11 | 46 |
| Vermont----- | -- | -- | -- | 38 | 62 | -- | -- |
| Virginia----- | 28 | 5 | -- | 21 | 16 | 11 | 19 |
| West Virginia----- | -- | -- | -- | -- | -- | -- | 100 |
| Flyway----- | 6 | 7 | 14 | 25 | 18 | 13 | 17 |

TABLE I-6.--Percentages of 1960 waterfowl hunters who, if the daily bag limit were 4 ducks, would prefer a closed season if it were each of the following numbers of days in length

| | Days over-- | | | | | | | | | |
|---------------------|-------------|----|----|----|----|-----|-----|-----|-----|-----|
| | 70 | 70 | 60 | 50 | 40 | 35 | 30 | 25 | 20 | 15 |
| Pacific | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Arizona----- | 36 | 36 | 36 | 36 | 36 | 60 | 72 | 72 | 72 | 80 |
| California----- | 26 | 31 | 35 | 46 | 49 | 56 | 74 | 76 | 77 | 79 |
| Idaho----- | 17 | 38 | 42 | 46 | 46 | 50 | 54 | 54 | 54 | 62 |
| Nevada----- | 10 | 20 | 20 | 20 | 20 | 25 | 34 | 34 | 34 | 39 |
| Oregon----- | 23 | 27 | 29 | 52 | 54 | 60 | 78 | 80 | 81 | 82 |
| Utah----- | 20 | 29 | 31 | 54 | 60 | 70 | 79 | 79 | 82 | 82 |
| Washington----- | 12 | 17 | 19 | 35 | 39 | 50 | 73 | 73 | 75 | 78 |
| Flyway----- | 21 | 27 | 30 | 44 | 47 | 55 | 72 | 73 | 74 | 77 |
| Central | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Colorado----- | 15 | 17 | 17 | 37 | 40 | 48 | 58 | 62 | 65 | 69 |
| Kansas----- | 20 | 22 | 24 | 29 | 31 | 41 | 69 | 73 | 77 | 83 |
| Montana----- | 9 | 9 | 9 | 14 | 21 | 26 | 49 | 51 | 58 | 72 |
| Nebraska----- | 16 | 19 | 21 | 33 | 36 | 47 | 73 | 74 | 75 | 83 |
| New Mexico----- | 24 | 24 | 31 | 31 | 31 | 38 | 56 | 56 | 61 | 74 |
| North Dakota----- | 19 | 23 | 23 | 28 | 30 | 52 | 67 | 75 | 77 | 81 |
| Oklahoma----- | 17 | 21 | 26 | 36 | 40 | 46 | 74 | 74 | 77 | 85 |
| South Dakota----- | 13 | 13 | 13 | 20 | 24 | 32 | 61 | 76 | 79 | 81 |
| Texas----- | 30 | 31 | 34 | 42 | 45 | 48 | 70 | 70 | 74 | 78 |
| Wyoming----- | 3 | 8 | 8 | 18 | 30 | 35 | 50 | 50 | 52 | 100 |
| Flyway----- | 19 | 21 | 22 | 31 | 34 | 43 | 66 | 70 | 73 | 79 |
| Mississippi | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Alabama----- | 5 | 5 | 5 | 26 | 31 | 53 | 63 | 63 | 63 | 63 |
| Arkansas----- | 20 | 20 | 21 | 28 | 30 | 42 | 66 | 69 | 77 | 84 |
| Illinois----- | 18 | 21 | 23 | 34 | 37 | 50 | 69 | 72 | 74 | 79 |
| Indiana----- | 23 | 23 | 24 | 31 | 35 | 42 | 56 | 59 | 68 | 73 |
| Iowa----- | 25 | 25 | 29 | 38 | 42 | 52 | 68 | 69 | 74 | 79 |
| Kentucky----- | 25 | 25 | 25 | 25 | 25 | 40 | 69 | 69 | 69 | 69 |
| Louisiana----- | 14 | 19 | 20 | 36 | 38 | 57 | 78 | 79 | 84 | 86 |
| Michigan----- | 22 | 24 | 28 | 35 | 38 | 48 | 60 | 63 | 67 | 70 |
| Minnesota----- | 22 | 22 | 22 | 32 | 35 | 49 | 66 | 72 | 77 | 81 |
| Mississippi----- | 21 | 21 | 21 | 23 | 30 | 42 | 81 | 81 | 81 | 86 |
| Missouri----- | 11 | 13 | 16 | 33 | 39 | 54 | 72 | 74 | 78 | 82 |
| Ohio----- | 15 | 21 | 24 | 38 | 39 | 48 | 68 | 72 | 77 | 84 |
| Tennessee----- | 16 | 17 | 17 | 22 | 24 | 44 | 74 | 79 | 82 | 90 |
| Wisconsin----- | 21 | 23 | 24 | 31 | 42 | 52 | 66 | 75 | 76 | 81 |
| Flyway----- | 19 | 21 | 23 | 33 | 38 | 50 | 67 | 72 | 75 | 80 |
| Atlantic | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Connecticut----- | 8 | 15 | 15 | 15 | 15 | 23 | 65 | 65 | 65 | 65 |
| Delaware----- | 18 | 24 | 29 | 35 | 35 | 35 | 67 | 67 | 73 | 73 |
| Florida----- | 27 | 27 | 33 | 45 | 48 | 48 | 83 | 83 | 83 | 83 |
| Georgia----- | 14 | 14 | 14 | 14 | 14 | 28 | 61 | 61 | 61 | 81 |
| Maine----- | 6 | 8 | 8 | 11 | 11 | 27 | 44 | 45 | 48 | 64 |
| Maryland----- | 31 | 31 | 31 | 44 | 53 | 66 | 79 | 83 | 83 | 87 |
| Massachusetts----- | 14 | 14 | 16 | 27 | 31 | 36 | 58 | 63 | 67 | 73 |
| New Hampshire----- | 15 | 15 | 15 | 15 | 15 | 15 | 44 | 44 | 72 | 72 |
| New Jersey----- | -- | 7 | 7 | 14 | 35 | 43 | 71 | 71 | 71 | 78 |
| New York----- | 20 | 22 | 24 | 25 | 28 | 31 | 50 | 53 | 59 | 64 |
| North Carolina----- | 18 | 20 | 20 | 36 | 43 | 52 | 72 | 75 | 77 | 79 |
| Pennsylvania----- | 13 | 13 | 13 | 15 | 15 | 18 | 48 | 56 | 59 | 59 |
| Rhode Island----- | 16 | 16 | 16 | 33 | 33 | 33 | 67 | 67 | 67 | 83 |
| South Carolina----- | 23 | 23 | 23 | 29 | 29 | 37 | 72 | 80 | 80 | 80 |
| Vermont----- | 38 | 38 | 38 | 38 | 38 | 100 | 100 | 100 | 100 | 100 |
| Virginia----- | 24 | 25 | 29 | 40 | 49 | 57 | 74 | 77 | 79 | 81 |
| West Virginia----- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Flyway----- | 18 | 19 | 21 | 27 | 32 | 39 | 63 | 66 | 69 | 73 |

TABLE I-7. --Percentages of 1960 waterfowl hunters who, if the daily bag limit were 3 ducks, would prefer a closed season if it were each of the following numbers of days in length

| | Days over-- | | | | | | | | | |
|---------------------|-------------|----|----|----|----|-----|-----|-----|-----|-----|
| | 70 | 70 | 60 | 50 | 40 | 35 | 30 | 25 | 20 | 15 |
| Pacific | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Arizona----- | 45 | 45 | 45 | 45 | 45 | 68 | 80 | 80 | 80 | 80 |
| California----- | 50 | 53 | 54 | 63 | 65 | 69 | 78 | 80 | 80 | 83 |
| Idaho----- | 17 | 35 | 39 | 39 | 39 | 43 | 52 | 52 | 56 | 60 |
| Nevada----- | 25 | 29 | 29 | 29 | 29 | 29 | 39 | 39 | 39 | 39 |
| Oregon----- | 41 | 46 | 48 | 63 | 68 | 73 | 81 | 83 | 83 | 86 |
| Utah----- | 45 | 57 | 57 | 72 | 81 | 88 | 91 | 91 | 91 | 91 |
| Washington----- | 28 | 32 | 34 | 47 | 48 | 56 | 75 | 75 | 78 | 80 |
| Flyway----- | 39 | 45 | 46 | 56 | 59 | 65 | 75 | 77 | 78 | 80 |
| Central | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Colorado----- | 27 | 29 | 31 | 44 | 49 | 54 | 63 | 65 | 67 | 71 |
| Kansas----- | 36 | 39 | 39 | 45 | 47 | 54 | 68 | 71 | 78 | 80 |
| Montana----- | 19 | 19 | 19 | 21 | 26 | 35 | 58 | 61 | 63 | 79 |
| Nebraska----- | 22 | 27 | 30 | 36 | 41 | 54 | 75 | 76 | 80 | 83 |
| New Mexico----- | 31 | 31 | 31 | 31 | 31 | 31 | 63 | 63 | 68 | 74 |
| North Dakota----- | 44 | 46 | 46 | 52 | 56 | 68 | 77 | 82 | 85 | 86 |
| Oklahoma----- | 36 | 38 | 43 | 47 | 49 | 58 | 77 | 78 | 78 | 83 |
| South Dakota----- | 35 | 35 | 38 | 42 | 45 | 52 | 74 | 78 | 83 | 84 |
| Texas----- | 54 | 55 | 57 | 61 | 62 | 67 | 79 | 81 | 81 | 85 |
| Wyoming----- | 44 | 47 | 47 | 47 | 47 | 52 | 62 | 62 | 88 | 88 |
| Flyway----- | 38 | 40 | 42 | 47 | 50 | 58 | 73 | 76 | 79 | 82 |
| Mississippi | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Alabama----- | 37 | 37 | 37 | 37 | 37 | 58 | 63 | 63 | 63 | 63 |
| Arkansas----- | 33 | 33 | 34 | 37 | 44 | 53 | 74 | 76 | 84 | 90 |
| Illinois----- | 35 | 37 | 37 | 46 | 50 | 61 | 72 | 75 | 76 | 81 |
| Indiana----- | 24 | 24 | 24 | 37 | 38 | 40 | 52 | 61 | 64 | 73 |
| Iowa----- | 38 | 40 | 42 | 46 | 47 | 59 | 71 | 72 | 78 | 81 |
| Kentucky----- | 32 | 32 | 32 | 39 | 39 | 54 | 84 | 84 | 84 | 84 |
| Louisiana----- | 43 | 44 | 46 | 55 | 58 | 75 | 83 | 86 | 88 | 88 |
| Michigan----- | 30 | 32 | 34 | 40 | 44 | 52 | 62 | 66 | 71 | 75 |
| Minnesota----- | 37 | 37 | 37 | 41 | 45 | 55 | 69 | 77 | 82 | 85 |
| Mississippi----- | 30 | 30 | 30 | 35 | 35 | 49 | 79 | 79 | 81 | 86 |
| Missouri----- | 31 | 34 | 35 | 44 | 46 | 59 | 74 | 77 | 81 | 85 |
| Ohio----- | 24 | 30 | 37 | 43 | 44 | 52 | 74 | 79 | 81 | 86 |
| Tennessee----- | 24 | 25 | 25 | 29 | 38 | 54 | 77 | 82 | 86 | 90 |
| Wisconsin----- | 29 | 32 | 32 | 38 | 51 | 55 | 73 | 77 | 80 | 86 |
| Flyway----- | 33 | 35 | 36 | 42 | 47 | 57 | 71 | 76 | 79 | 83 |
| Atlantic | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Connecticut----- | 35 | 42 | 42 | 42 | 42 | 58 | 92 | 92 | 92 | 92 |
| Delaware----- | 25 | 31 | 36 | 42 | 48 | 60 | 75 | 80 | 80 | 80 |
| Florida----- | 42 | 42 | 48 | 50 | 50 | 50 | 77 | 83 | 83 | 86 |
| Georgia----- | 28 | 28 | 28 | 28 | 28 | 28 | 47 | 47 | 47 | 67 |
| Maine----- | 6 | 8 | 8 | 11 | 12 | 31 | 54 | 57 | 60 | 64 |
| Maryland----- | 38 | 38 | 42 | 52 | 56 | 75 | 87 | 87 | 87 | 92 |
| Massachusetts----- | 20 | 20 | 22 | 32 | 35 | 41 | 61 | 63 | 65 | 69 |
| New Hampshire----- | 31 | 31 | 31 | 31 | 31 | 44 | 44 | 59 | 72 | 72 |
| New Jersey----- | 14 | 21 | 21 | 42 | 50 | 57 | 71 | 71 | 71 | 78 |
| New York----- | 20 | 22 | 25 | 26 | 27 | 33 | 49 | 49 | 64 | 69 |
| North Carolina----- | 29 | 30 | 30 | 43 | 48 | 64 | 77 | 81 | 82 | 82 |
| Pennsylvania----- | 22 | 22 | 22 | 22 | 22 | 27 | 54 | 58 | 63 | 63 |
| Rhode Island----- | 33 | 33 | 33 | 33 | 33 | 33 | 67 | 67 | 67 | 83 |
| South Carolina----- | 37 | 37 | 37 | 44 | 44 | 58 | 80 | 80 | 80 | 80 |
| Vermont----- | 38 | 38 | 38 | 38 | 38 | 100 | 100 | 100 | 100 | 100 |
| Virginia----- | 40 | 40 | 43 | 47 | 57 | 67 | 76 | 78 | 80 | 82 |
| West Virginia----- | -- | -- | -- | -- | -- | -- | -- | -- | 52 | 52 |
| Flyway----- | 27 | 28 | 30 | 35 | 38 | 48 | 66 | 68 | 73 | 76 |

TABLE I-8.--Percentages of 1960 waterfowl hunters who, if the daily bag limit were 2 ducks, would prefer a closed season if it were each of the following numbers of days in length

| | Days over-- | | | | | | | | | |
|---------------------|-------------|----|----|----|----|-----|-----|-----|-----|-----|
| | 70 | 70 | 60 | 50 | 40 | 35 | 30 | 25 | 20 | 15 |
| Pacific | | | | | | | | | | |
| Flyway:----- | | | | | | | | | | |
| Arizona----- | 68 | 68 | 68 | 68 | 68 | 68 | 80 | 80 | 80 | 80 |
| California----- | 74 | 76 | 76 | 79 | 80 | 82 | 85 | 86 | 86 | 87 |
| Idaho----- | 56 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 69 | 74 |
| Nevada----- | 60 | 65 | 65 | 65 | 70 | 70 | 70 | 70 | 70 | 70 |
| Oregon----- | 69 | 72 | 73 | 76 | 79 | 83 | 88 | 91 | 91 | 91 |
| Utah----- | 76 | 78 | 78 | 88 | 88 | 88 | 91 | 91 | 91 | 91 |
| Washington----- | 64 | 66 | 67 | 73 | 73 | 76 | 84 | 85 | 87 | 89 |
| Flyway----- | 69 | 72 | 73 | 77 | 77 | 79 | 84 | 85 | 85 | 87 |
| Central | | | | | | | | | | |
| Flyway:----- | | | | | | | | | | |
| Colorado----- | 59 | 59 | 59 | 64 | 64 | 68 | 71 | 73 | 77 | 77 |
| Kansas----- | 71 | 72 | 73 | 74 | 74 | 76 | 83 | 83 | 83 | 87 |
| Montana----- | 70 | 72 | 72 | 75 | 77 | 77 | 79 | 79 | 79 | 88 |
| Nebraska----- | 68 | 69 | 71 | 77 | 77 | 80 | 89 | 90 | 91 | 92 |
| New Mexico----- | 60 | 60 | 60 | 67 | 67 | 67 | 74 | 74 | 74 | 74 |
| North Dakota----- | 62 | 62 | 64 | 73 | 73 | 76 | 86 | 88 | 90 | 91 |
| Oklahoma----- | 64 | 64 | 67 | 69 | 75 | 77 | 86 | 86 | 86 | 87 |
| South Dakota----- | 76 | 76 | 76 | 78 | 78 | 83 | 84 | 86 | 86 | 88 |
| Texas----- | 75 | 75 | 75 | 79 | 79 | 82 | 85 | 85 | 86 | 87 |
| Wyoming----- | 57 | 57 | 57 | 57 | 57 | 57 | 69 | 69 | 88 | 88 |
| Flyway----- | 69 | 69 | 70 | 74 | 75 | 78 | 83 | 84 | 85 | 87 |
| Mississippi | | | | | | | | | | |
| Flyway:----- | | | | | | | | | | |
| Alabama----- | 51 | 51 | 51 | 51 | 51 | 60 | 65 | 65 | 70 | 70 |
| Arkansas----- | 66 | 66 | 67 | 70 | 71 | 75 | 87 | 89 | 92 | 95 |
| Illinois----- | 67 | 68 | 69 | 71 | 73 | 77 | 83 | 84 | 86 | 87 |
| Indiana----- | 49 | 51 | 51 | 52 | 52 | 54 | 64 | 70 | 73 | 76 |
| Iowa----- | 60 | 63 | 63 | 66 | 68 | 71 | 80 | 81 | 86 | 87 |
| Kentucky----- | 69 | 69 | 69 | 77 | 77 | 85 | 92 | 92 | 92 | 92 |
| Louisiana----- | 73 | 75 | 76 | 80 | 80 | 86 | 88 | 90 | 91 | 92 |
| Michigan----- | 51 | 53 | 55 | 60 | 60 | 64 | 71 | 73 | 75 | 77 |
| Minnesota----- | 73 | 73 | 73 | 75 | 76 | 81 | 86 | 87 | 90 | 92 |
| Mississippi----- | 53 | 53 | 53 | 58 | 60 | 63 | 86 | 88 | 88 | 95 |
| Missouri----- | 58 | 58 | 60 | 69 | 70 | 76 | 89 | 91 | 92 | 94 |
| Ohio----- | 51 | 59 | 59 | 65 | 68 | 73 | 86 | 86 | 88 | 90 |
| Tennessee----- | 51 | 51 | 51 | 59 | 61 | 70 | 89 | 94 | 94 | 95 |
| Wisconsin----- | 48 | 49 | 51 | 54 | 60 | 66 | 76 | 78 | 80 | 85 |
| Flyway----- | 60 | 62 | 63 | 66 | 68 | 73 | 81 | 83 | 85 | 87 |
| Atlantic | | | | | | | | | | |
| Flyway:----- | | | | | | | | | | |
| Connecticut----- | 74 | 74 | 74 | 74 | 81 | 87 | 87 | 94 | 94 | 94 |
| Delaware----- | 49 | 55 | 55 | 55 | 60 | 60 | 80 | 80 | 80 | 80 |
| Florida----- | 71 | 71 | 74 | 74 | 74 | 74 | 85 | 85 | 94 | 94 |
| Georgia----- | 42 | 42 | 42 | 61 | 61 | 61 | 61 | 61 | 61 | 81 |
| Maine----- | 45 | 47 | 47 | 48 | 52 | 66 | 81 | 81 | 89 | 92 |
| Maryland----- | 59 | 64 | 64 | 78 | 78 | 87 | 96 | 96 | 96 | 100 |
| Massachusetts----- | 29 | 31 | 31 | 38 | 40 | 47 | 66 | 72 | 72 | 76 |
| New Hampshire----- | 59 | 59 | 59 | 59 | 59 | 72 | 87 | 87 | 87 | 87 |
| New Jersey----- | 43 | 50 | 50 | 57 | 57 | 64 | 78 | 78 | 78 | 78 |
| New York----- | 43 | 45 | 45 | 46 | 51 | 52 | 60 | 62 | 70 | 79 |
| North Carolina----- | 49 | 50 | 50 | 57 | 62 | 71 | 81 | 83 | 84 | 84 |
| Pennsylvania----- | 37 | 37 | 37 | 37 | 41 | 48 | 66 | 70 | 70 | 70 |
| Rhode Island----- | 52 | 52 | 52 | 52 | 52 | 52 | 83 | 83 | 83 | 83 |
| South Carolina----- | 43 | 43 | 50 | 50 | 50 | 71 | 79 | 79 | 79 | 79 |
| Vermont----- | 38 | 38 | 38 | 38 | 38 | 100 | 100 | 100 | 100 | 100 |
| Virginia----- | 60 | 60 | 60 | 62 | 69 | 76 | 86 | 86 | 86 | 87 |
| West Virginia----- | -- | -- | -- | -- | -- | -- | -- | -- | 52 | 52 |
| Flyway----- | 48 | 49 | 50 | 54 | 57 | 64 | 75 | 77 | 80 | 83 |

TABLE I-9.--Percentages of 1960 waterfowl hunters who, if the daily bag limit were 1 duck, would prefer a closed season if it were each of the following numbers of days in length

| | Days over-- | | | | | | | | | |
|---------------------|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 70 | 70 | 60 | 50 | 40 | 35 | 30 | 25 | 20 | 15 |
| Pacific | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Arizona----- | 76 | 76 | 76 | 76 | 76 | 76 | 88 | 88 | 88 | 88 |
| California----- | 87 | 87 | 87 | 90 | 90 | 91 | 91 | 91 | 91 | 92 |
| Idaho----- | 77 | 82 | 82 | 82 | 82 | 87 | 87 | 87 | 87 | 91 |
| Nevada----- | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| Oregon----- | 89 | 90 | 90 | 90 | 93 | 93 | 93 | 93 | 93 | 94 |
| Utah----- | 89 | 91 | 91 | 91 | 91 | 91 | 95 | 95 | 95 | 95 |
| Washington----- | 86 | 89 | 89 | 91 | 91 | 91 | 93 | 93 | 93 | 93 |
| Flyway----- | 86 | 87 | 87 | 89 | 89 | 90 | 91 | 91 | 91 | 92 |
| Central | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Colorado----- | 84 | 84 | 84 | 84 | 84 | 84 | 90 | 90 | 90 | 90 |
| Kansas----- | 89 | 89 | 89 | 89 | 89 | 89 | 90 | 90 | 91 | 91 |
| Montana----- | 91 | 91 | 91 | 93 | 93 | 93 | 95 | 95 | 95 | 95 |
| Nebraska----- | 86 | 86 | 87 | 88 | 88 | 88 | 93 | 93 | 93 | 93 |
| New Mexico----- | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 | 86 |
| North Dakota----- | 91 | 92 | 92 | 94 | 94 | 94 | 96 | 97 | 97 | 97 |
| Oklahoma----- | 87 | 87 | 90 | 92 | 92 | 92 | 94 | 94 | 94 | 94 |
| South Dakota----- | 93 | 93 | 93 | 95 | 95 | 95 | 95 | 95 | 95 | 96 |
| Texas----- | 89 | 89 | 89 | 90 | 90 | 91 | 92 | 93 | 93 | 93 |
| Wyoming----- | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Flyway----- | 89 | 89 | 90 | 91 | 91 | 91 | 93 | 93 | 94 | 94 |
| Mississippi | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Alabama----- | 76 | 76 | 76 | 76 | 76 | 81 | 81 | 81 | 86 | 86 |
| Arkansas----- | 88 | 88 | 88 | 91 | 91 | 92 | 97 | 97 | 98 | 98 |
| Illinois----- | 87 | 88 | 88 | 88 | 89 | 89 | 90 | 90 | 91 | 91 |
| Indiana----- | 73 | 74 | 74 | 76 | 76 | 78 | 79 | 81 | 83 | 83 |
| Iowa----- | 85 | 85 | 85 | 85 | 85 | 85 | 88 | 90 | 92 | 92 |
| Kentucky----- | 77 | 77 | 77 | 77 | 77 | 85 | 92 | 92 | 92 | 92 |
| Louisiana----- | 89 | 89 | 89 | 92 | 92 | 94 | 94 | 94 | 94 | 94 |
| Michigan----- | 82 | 83 | 84 | 85 | 87 | 87 | 87 | 87 | 89 | 91 |
| Minnesota----- | 88 | 88 | 89 | 89 | 89 | 90 | 92 | 92 | 93 | 93 |
| Mississippi----- | 90 | 90 | 90 | 90 | 90 | 90 | 98 | 98 | 98 | 98 |
| Missouri----- | 89 | 89 | 89 | 90 | 91 | 95 | 95 | 95 | 95 | 95 |
| Ohio----- | 74 | 82 | 85 | 90 | 91 | 91 | 96 | 96 | 96 | 96 |
| Tennessee----- | 85 | 85 | 85 | 86 | 86 | 94 | 97 | 99 | 99 | 99 |
| Wisconsin----- | 80 | 81 | 82 | 84 | 85 | 85 | 89 | 89 | 89 | 89 |
| Flyway----- | 84 | 85 | 86 | 87 | 88 | 89 | 91 | 91 | 92 | 92 |
| Atlantic | | | | | | | | | | |
| Flyway: | | | | | | | | | | |
| Connecticut----- | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Delaware----- | 82 | 87 | 87 | 87 | 87 | 87 | 93 | 93 | 93 | 93 |
| Florida----- | 85 | 85 | 85 | 85 | 85 | 85 | 91 | 91 | 91 | 91 |
| Georgia----- | 42 | 42 | 42 | 61 | 61 | 61 | 61 | 61 | 61 | 81 |
| Maine----- | 65 | 66 | 66 | 79 | 82 | 84 | 95 | 95 | 95 | 95 |
| Maryland----- | 87 | 87 | 87 | 87 | 87 | 92 | 92 | 92 | 92 | 96 |
| Massachusetts----- | 62 | 64 | 64 | 67 | 72 | 77 | 81 | 81 | 81 | 81 |
| New Hampshire----- | 59 | 59 | 59 | 59 | 59 | 87 | 87 | 87 | 87 | 87 |
| New Jersey----- | 86 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 | 93 |
| New York----- | 82 | 82 | 84 | 85 | 86 | 86 | 89 | 89 | 89 | 91 |
| North Carolina----- | 74 | 74 | 76 | 77 | 77 | 80 | 85 | 86 | 86 | 86 |
| Pennsylvania----- | 58 | 58 | 62 | 70 | 70 | 76 | 79 | 79 | 79 | 79 |
| Rhode Island----- | 67 | 67 | 67 | 67 | 67 | 67 | 83 | 83 | 83 | 83 |
| South Carolina----- | 65 | 71 | 71 | 79 | 86 | 86 | 86 | 86 | 86 | 86 |
| Vermont----- | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Virginia----- | 90 | 90 | 92 | 93 | 93 | 93 | 95 | 95 | 95 | 95 |
| West Virginia----- | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Flyway----- | 77 | 78 | 79 | 82 | 83 | 85 | 88 | 88 | 88 | 89 |

J. DUCK STAMP SALES TABLES

TABLE J-1.--Comparison of hunting activity and waterfowl kill in 1960 of hunters who continued to buy duck stamps in 1961 and 1962 with those that did not

| Purchased stamp in: | | Number of hunters | Days per hunter | Kill per hunter | | | Ducks per day |
|----------------------------|------|-------------------|-----------------|-----------------|-------|-------|---------------|
| 1961 | 1962 | | | Ducks | Geese | Coots | |
| Pacific Flyway: | | | | | | | |
| Yes | Yes | 266 | 6.6 | 14.94 | 1.39 | .45 | 2.25 |
| No | No | 22 | 3.3 | 5.23 | .41 | 1.68 | 1.60 |
| Yes | No | 114 | 2.7 | 4.78 | .50 | .10 | 1.78 |
| No | Yes | 13 | 5.7 | 8.54 | .31 | .38 | 1.50 |
| | | 415 | | | | | |
| Central Flyway: | | | | | | | |
| Yes | Yes | 213 | 6.1 | 8.25 | 1.15 | .22 | 1.34 |
| No | No | 41 | 2.7 | 3.32 | .27 | -- | 1.24 |
| Yes | No | 191 | 3.4 | 3.45 | .27 | .07 | 1.03 |
| No | Yes | 12 | 1.8 | 3.17 | .08 | -- | 1.73 |
| | | 457 | | | | | |
| Mississippi Flyway: | | | | | | | |
| Yes | Yes | 459 | 7.9 | 8.07 | .47 | .58 | 1.02 |
| No | No | 100 | 3.4 | 3.46 | .06 | .13 | 1.01 |
| Yes | No | 317 | 4.2 | 4.50 | .18 | .28 | 1.07 |
| No | Yes | 16 | 4.2 | 4.12 | .25 | -- | 0.99 |
| | | 892 | | | | | |
| Atlantic Flyway: | | | | | | | |
| Yes | Yes | 206 | 6.3 | 5.75 | .79 | .20 | 0.91 |
| No | No | 25 | 1.2 | 1.16 | -- | -- | 0.94 |
| Yes | No | 81 | 3.0 | 2.36 | .18 | .09 | 0.78 |
| No | Yes | 11 | 3.1 | 1.46 | .36 | -- | 0.47 |
| | | 323 | | | | | |
| Flyways: (combined) | | | | | | | |
| Yes | Yes | 1,144 | 7.0 | 9.28 | .87 | .41 | 1.32 |
| No | No | 188 | 3.0 | 3.33 | .14 | .27 | 1.13 |
| Yes | No | 703 | 3.6 | 4.01 | .26 | .17 | 1.12 |
| No | Yes | 52 | 3.8 | 4.44 | .25 | .10 | 1.17 |
| Total----- | | 2,087 | | | | | |

TABLE J-2.--Migratory bird hunting stamp sales, July 1, 1961 to June 30, 1963

| States | 7-1-61 to 6-30-62 | 7-1-62 to 6-30-63 | States | 7-1-61 to 6-30-62 | 7-1-62 to 6-30-63 |
|--------------------------------|-------------------------|-------------------------|----------------------------|-------------------------|-------------------------|
| Pacific Flyway: | | | Mississippi Flyway: | | |
| Alaska----- | 10,557 | 10,371 | Alabama----- | 5,782 | 6,292 |
| Arizona----- | 7,288 | 6,040 | Arkansas----- | 19,037 | 9,549 |
| California----- | 123,302 | 125,199 | Illinois----- | 63,435 | 42,256 |
| Idaho----- | 25,547 | 22,389 | Indiana----- | 20,862 | 15,965 |
| Nevada----- | 5,427 | 7,983 | Iowa----- | 41,147 | 30,602 |
| Oregon----- | 42,446 | 39,102 | Kentucky----- | 6,337 | 4,488 |
| Utah----- | 19,086 | 21,907 | Louisiana----- | 45,644 | 39,766 |
| Washington----- | 63,374 | 62,091 | Michigan----- | 64,628 | 49,610 |
| Hawaii----- | 15 | 9 | Minnesota----- | 85,251 | 78,071 |
| | | | Mississippi----- | 7,128 | 7,102 |
| | | | Missouri----- | 39,118 | 27,016 |
| | | | Ohio----- | 24,853 | 20,057 |
| | | | Tennessee----- | 15,472 | 8,066 |
| | | | Wisconsin----- | 89,848 | 73,141 |
| Subtotal----- | 297,042 | 295,091 | Subtotal----- | 528,542 | 411,981 |
| Central Flyway: | | | Atlantic Flyway: | | |
| Colorado----- | 25,625 | 15,623 | Connecticut----- | 6,204 | 7,497 |
| Kansas----- | 40,275 | 21,988 | Delaware----- | 6,336 | 5,664 |
| Montana----- | 21,728 | 14,561 | District of Columbia----- | 1,322 | 1,434 |
| Nebraska----- | 33,409 | 19,027 | Florida----- | 23,702 | 20,656 |
| New Mexico----- | 3,789 | 1,957 | Georgia----- | 6,651 | 5,882 |
| North Dakota----- | 25,675 | 25,550 | Maine----- | 7,213 | 8,020 |
| Oklahoma----- | 24,844 | 14,829 | Maryland----- | 17,077 | 18,063 |
| South Dakota----- | 30,549 | 28,127 | Massachusetts----- | 17,411 | 17,162 |
| Texas----- | 68,862 | 51,518 | New Hampshire----- | 4,220 | 4,333 |
| Wyoming----- | 5,147 | 3,662 | New Jersey----- | 15,226 | 18,734 |
| | | | New York----- | 53,731 | 50,014 |
| | | | North Carolina----- | 17,888 | 20,394 |
| | | | Pennsylvania----- | 25,684 | 27,621 |
| | | | Rhode Island----- | 2,057 | 1,625 |
| | | | South Carolina----- | 10,657 | 10,541 |
| | | | Vermont----- | 3,616 | 3,637 |
| | | | Virginia----- | 12,365 | 13,580 |
| | | | West Virginia----- | 1,218 | 1,454 |
| | | | Puerto Rico----- | 378 | 722 |
| Subtotal----- | 279,903 | 196,842 | Subtotal----- | 232,956 | 237,033 |
| Philatelic agency:----- | 7,560 | 6,606 | Total----- | 1,346,003 | 1,140,947 |

K. WATERFOWL STATUS AND UTILIZATION TABLES

TABLE K-1.--Waterfowl status and utilization on specific National Wildlife Refuges,
September 1, 1961 to August 31, 1962

| Refuge | Use days-- | | Breeding populations | | Production | |
|---------------------------------------|------------|------------|----------------------|-------|------------|-------|
| | Ducks | Geese | Ducks | Geese | Ducks | Geese |
| Pacific Flyway: | | | | | | |
| Aleutian Is. (Amchitka), Alaska---- | 561,400 | 1,224,000 | 1,100 | -- | 1,300 | -- |
| Bear River, Utah----- | 24,794,126 | 795,725 | 25,790 | 1,136 | 61,900 | 2,086 |
| Camas, Idaho----- | 2,379,377 | 67,753 | 3,700 | 180 | 2,830 | 157 |
| Cold Springs, Oregon----- | 17,370,600 | 1,736,200 | 90 | 4 | 200 | 12 |
| Colusa, California----- | 12,918,000 | 7,057,000 | 30 | -- | 60 | -- |
| Deer Flat, Idaho----- | 37,024,344 | 752,451 | 122 | -- | 730 | -- |
| Kenai, Alaska----- | 1,212,665 | 208,376 | 1,000 | 20 | 4,250 | 50 |
| Lower Klamath, Oregon----- | 75,967,545 | 11,792,222 | 10,500 | 1,000 | 20,610 | 2,500 |
| Malheur, Oregon----- | 7,113,344 | 2,029,510 | 6,590 | 572 | 18,425 | 1,100 |
| McKay Creek, Oregon----- | 6,537,000 | 2,036,100 | 200 | -- | 250 | -- |
| McNary, Washington----- | 1,722,300 | 504,800 | 174 | 82 | 520 | 160 |
| Merced, California----- | 11,010,090 | 3,846,031 | 20 | -- | 50 | -- |
| Minidoka, Idaho----- | 10,225,950 | 106,330 | 2,530 | 44 | 6,325 | 110 |
| Ninepipe, Montana----- | 2,518,562 | 148,257 | 570 | 24 | 1,954 | 47 |
| Red Rock Lakes, Montana----- | 6,282,820 | 99,365 | 880 | 12 | 3,310 | 55 |
| Ruby Lake, Nevada----- | 1,658,348 | 85,043 | 1,380 | 440 | 2,005 | 300 |
| Sacramento, California----- | 66,106,000 | 15,860,000 | 60 | -- | 100 | -- |
| Salton Sea, California----- | 3,462,461 | 655,457 | -- | -- | -- | -- |
| Snake River, Idaho ¹ ----- | 2,190,600 | 104,800 | 800 | 150 | 2,164 | 264 |
| Sutter, California----- | 22,773,000 | 3,669,000 | 30 | -- | 100 | -- |
| Tule Lake, California----- | 51,461,372 | 19,374,729 | 7,950 | 600 | 29,200 | 915 |
| Turnbull, Washington----- | 2,231,271 | 216,180 | 4,097 | 164 | 2,355 | 102 |
| Upper Klamath, Oregon----- | 856,078 | 154,553 | 350 | 70 | 1,615 | 40 |
| Willapa, Washington----- | 3,684,311 | 736,576 | 52 | -- | 190 | -- |
| Central Flyway: | | | | | | |
| Aransas, Texas----- | 1,429,463 | 677,037 | 6 | -- | 10 | -- |
| Arrowwood, North Dakota----- | 900,543 | 126,030 | 1,368 | -- | 1,045 | -- |
| Bitter Lake, New Mexico----- | 5,226,907 | 54,550 | 1,590 | -- | 98 | -- |
| Bosque del Apache, New Mexico----- | 916,080 | 313,796 | 97 | -- | 368 | -- |
| Bowdoin, Montana----- | 4,380,208 | 239,442 | 16,359 | 210 | 19,380 | 250 |
| Buffalo Lakes, Texas----- | 33,999,180 | 1,140,883 | 2 | -- | 4 | -- |
| Crescent Lake, Nebraska----- | 1,653,211 | 87,717 | 3,017 | 302 | 1,722 | 89 |
| Des Lacs, North Dakota----- | 2,144,485 | 9,268 | 1,950 | -- | 1,704 | -- |
| Desoto, Nebraska----- | 1,568,550 | 619,000 | 6 | -- | 15 | -- |
| Hagerman, Texas----- | 702,324 | 842,793 | -- | -- | -- | -- |
| Kirwin, Kansas----- | 4,719,026 | 667,634 | 257 | 40 | 138 | 44 |
| Lacreek, South Dakota----- | 2,649,200 | 112,710 | 1,900 | -- | 2,515 | -- |
| Laguna Atascosa, Texas----- | 9,415,127 | 823,570 | 74 | -- | 190 | -- |
| Lake Andes, South Dakota----- | 13,580,000 | 581,900 | 1,250 | -- | 1,210 | -- |
| Lake Ilo, North Dakota----- | 1,045,960 | 17,044 | 1,068 | -- | 370 | -- |
| Lostwood, North Dakota----- | 1,340,135 | 4,421 | 1,200 | 6 | 3,915 | 10 |
| Lower Souris, North Dakota----- | 9,806,801 | 1,480,371 | 20,020 | 260 | 19,600 | 35 |
| Medicine Lake, Montana----- | 3,880,700 | 116,300 | 5,700 | 140 | 16,220 | 300 |
| Monte Vista, Colorado----- | 8,758,680 | 86,233 | 15,000 | 40 | 18,000 | 42 |
| Muleshoe, Texas----- | 3,240,530 | 174,138 | -- | -- | -- | -- |
| Quivira, Kansas----- | 13,855,422 | 1,211,290 | 417 | -- | 55 | -- |
| Salt Plains, Oklahoma----- | 1,610,907 | 1,834,963 | 100 | -- | 150 | -- |
| Sand Lake, South Dakota----- | 6,399,590 | 4,037,725 | 4,950 | 175 | 2,366 | 75 |
| Tewaukon, North Dakota----- | 1,303,555 | 540,130 | 1,856 | -- | 2,728 | -- |
| Tishomingo, Oklahoma----- | 1,325,200 | 1,800,729 | -- | -- | -- | -- |
| Upper Souris, North Dakota----- | 5,303,905 | 148,491 | 9,520 | 250 | 5,991 | 110 |
| Valentine, Nebraska----- | 7,105,790 | 22,239 | 2,626 | 28 | 3,930 | 12 |
| Waubay, South Dakota----- | 1,288,742 | 83,552 | 100 | 20 | 213 | 38 |

TABLE K-1.--Waterfowl status and utilization on specific National Wildlife Refuges,
September 1, 1961 to August 31, 1962--continued

| Refuge | Use days-- | | Breeding populations | | Production | |
|-----------------------------------|------------|-----------|----------------------|-------|------------|-------|
| | Ducks | Geese | Ducks | Geese | Ducks | Geese |
| Mississippi Flyway: | | | | | | |
| Agassiz, Minnesota----- | 7,132,855 | 273,161 | 16,334 | 200 | 11,902 | 160 |
| Big Lake, Arkansas----- | 1,361,778 | 13,706 | 250 | -- | 18 | -- |
| Chautauqua, Illinois----- | 2,536,592 | 399,805 | 170 | -- | 662 | -- |
| Delta, Louisiana----- | 6,996,640 | 3,042,417 | -- | -- | -- | -- |
| Holla Bend, Arkansas----- | 4,367,981 | 87,424 | 14 | 4 | 12 | 2 |
| Horicon, Wisconsin----- | 6,898,190 | 7,638,163 | 6,250 | -- | 4,678 | -- |
| Kentucky Woodlands, Kentucky---- | 909,853 | 737,854 | 50 | -- | 200 | -- |
| Lacassine, Louisiana----- | 11,938,475 | 3,627,893 | 50 | -- | 200 | -- |
| Mark Twain, Illinois----- | 11,390,837 | 1,117,949 | 480 | -- | 1,594 | -- |
| Mingo, Missouri----- | 3,277,672 | 737,823 | 400 | -- | 800 | -- |
| Necedah, Wisconsin----- | 1,511,680 | 620,760 | 450 | 30 | 970 | 50 |
| Noxubee, Mississippi----- | 2,151,320 | 6,327 | 2,000 | 14 | 500 | 3 |
| Reelfoot-Lake Isom, Tennessee---- | 10,513,860 | 1,775,228 | 570 | -- | 575 | -- |
| Rice Lake, Minnesota----- | 3,582,468 | 33,076 | 3,200 | 100 | 2,425 | 50 |
| Sabine, Louisiana----- | 9,875,143 | 4,598,176 | 1,770 | -- | 5,326 | -- |
| Seney, Michigan----- | 732,151 | 389,800 | 1,150 | 450 | 2,128 | 800 |
| Shiawassee, Michigan----- | 1,663,957 | 268,962 | 150 | 150 | 218 | 215 |
| Squaw Creek, Missouri----- | 4,958,877 | 7,832,116 | 24 | -- | 28 | -- |
| Swan Lake, Missouri----- | 4,611,000 | 8,869,500 | 20 | -- | 60 | -- |
| Tamarac, Minnesota----- | 4,040,080 | 30,893 | 7,528 | -- | 11,786 | -- |
| Tennessee, Tennessee----- | 8,125,502 | 1,070,902 | 87 | -- | 112 | -- |
| Union Slough, Iowa----- | 1,109,342 | 10,367 | 157 | -- | 482 | -- |
| Upper Mississippi, Minnesota---- | 14,808,332 | 245,372 | 6,539 | -- | 9,889 | -- |
| Wheeler, Alabama----- | 5,805,635 | 4,297,322 | 310 | -- | 450 | -- |
| White River, Arkansas----- | 10,706,570 | 201,040 | 108 | -- | 300 | -- |
| Atlantic Flyway: | | | | | | |
| Back Bay, Virginia----- | 1,259,957 | 1,646,365 | -- | -- | -- | -- |
| Blackbeard Is., Georgia----- | 1,419,735 | 50 | -- | -- | -- | -- |
| Blackwater, Maryland----- | 9,009,495 | 5,219,823 | 400 | 10 | 1,500 | 6 |
| Bombay Hook, Delaware----- | 2,175,118 | 2,646,670 | 648 | -- | 756 | -- |
| Brigantine, New Jersey----- | 7,877,131 | 4,377,149 | 33 | 23 | 191 | 115 |
| Chincoteague, Virginia----- | 2,093,098 | 582,969 | 66 | -- | 88 | -- |
| Mackay Island, North Carolina---- | 294,713 | 1,933,015 | 125 | -- | 200 | -- |
| Mattamuskeet, North Carolina---- | 7,393,580 | 8,949,898 | -- | -- | -- | -- |
| Montezuma, New York----- | 853,159 | 728,716 | 2,352 | 40 | 2,465 | 90 |
| Oak Orchard, New York----- | 375,892 | 727,585 | 352 | 2 | 540 | 5 |
| Okefenokee, Georgia----- | 1,824,020 | -- | 600 | -- | 1,200 | -- |
| Pea Island, North Carolina----- | 647,610 | 1,134,150 | 114 | -- | 230 | -- |
| Presquile, Virginia----- | 3,902,746 | 735,835 | 6 | -- | 18 | -- |
| Santee, South Carolina----- | 4,254,124 | 1,368,016 | -- | -- | -- | -- |
| Savannah, Georgia----- | 3,221,370 | 543 | -- | -- | -- | -- |
| St. Marks, Florida----- | 2,183,950 | 412,001 | 46 | -- | 69 | -- |
| Susquehanna, Maryland----- | 1,761,080 | 135,198 | -- | -- | -- | -- |
| Swanquarter, North Carolina----- | 1,440,000 | 81,000 | -- | -- | -- | -- |

¹ Now incorporated in Deer Flat Refuge



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UNITED STATES DEPARTMENT OF THE INTERIOR

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